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Ecological Survey of:

FISHERMAN'S CAMP, SAN BERNARDINO COUNTY

CANDIDATE RESEARCH NATURAL AREA
Arrowhead Ranger District
San Bernardino National Forest
United States Forest Service

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This document describing Fisherman's Camp was prepared as a companion piece to two other candidate RNA reports: Broom Flat RNA Establishment Report and Horse Meadow RNA Establishment Report. The portions of this report which deal with general information about the San Bernardino Mountain region are shared in part or in full with these reports. They are filled as separate reports in order that each candidate RNA site may be considered individually.

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I. INTRODUCTION

SITE DESCRIPTION

The Fisherman's Camp candidate Research Natural Area covers approximately 431 acres (172 ha) north of Running Springs, San Bernardino County. Fisherman's Camp includes the ridgeline and moderate to steep slopes of a northeast-southwest trending ridge. This area supports stands of a complex coniferous-hardwood forest that has coulter pine (*Pinus coulteri*), the target element for this candidate Research Natural Area, as one of the dominant forest trees. This site is unusual for a coulter pine forest because of the large number of associated trees. In a mosaic throughout the site, *Pinus coulteri* shares dominance with one of two oak species: canyon live oak (*Q. chrysolepis*) and black oak (*Quercus kelloggii*). Throughout the site, but particularily at the northern end, the woodland-forest complex is enriched by species common to the ponderosa pine forest of the western slopes of the San Bernardino Mountains. Ponderosa pine (*Pinus ponderosa*) and jeffrey pine (*P. jeffreyi*) are most abundant here on south-facing slopes; white fir (*Abies concolor*) and sugar pine (*Pinus lambertiana*) are typically dominant on northern exposures. Incense cedar (*Calocedrus decurrens*) occurs in this forest in relatively moist soils at lower elevations. As slope, exposure, and grade vary throughout the Fisherman's Camp candidate RNA, the vegetation grades with imperceptable boundaries from a relatively dense *Pinus coulteri-Quercus chrysolepis* or *Quercus kelloggii* woodland to a forest dominated by a variable array of the coniferous trees found at the site.

The eastern boundary of the Fisherman's Camp cRNA is set along the banks of Deep Creek, a perennial stream with abundant year-round flow. This creek, actually the east fork of the Mohave River, is fed by the numerous tributaries that drain most of the mountainous region from Lake Arrowhead to Big Bear. Here, along boulder-strewn banks, the rushing creek is bordered by a lush southern Californian variant of the montane riparian forest. This riparian vegetation reaches upslope in narrow bands along small tributaries that drain the southern part of the ridge.

Although the stands of coulter pine that occur here, especially together with the canyon live oak, are not considered typical of the coulter pine chaparral-woodland-forests associations in the San Bernardino Mountains, they represent a very interesting and restricted forest type for this range. The diversity of the associated coniferous trees in this *Pinus coulteri* forest add interest to the site.

PHYSICAL DESCRIPTION

Fisherman's Camp candidate RNA is approximately 4.5 miles (7.2 km) due east of the town of Lake Arrowhead and 1.5 miles (2.4 km) north of Running Springs in San Bernardino County, California (See Map 1: Vicinity Map; Map 2: US Forest Service Vicinity Map). Fisherman's Camp cRNA has a number of access points. The most convenient access to this site is from Camp O'onga for Boys and Girls (3077 State Highway 18, Running Springs, California). This private summer camp lies on the southwestern end of the ridge that forms the western boundary of the proposed RNA. A well-maintained trail from the back of Camp O'onga leads up along the ridge and affords easy access, with moderate elevation gain, to the highest elevations of the Forest Service site. The trail splits a short distance from Camp O'onga; one fork, signed and marked for the Camp O'onga hikers, leads directly to Deep Creek at the upper end of Section 29. Along Deep Creek, small creekside trails meander through the dense riparian vegetation, appearing and disappearing along the creek's edge. If permission can be granted to have access through these private lands, these two trails offer easy access to both Fisherman's Camp ridge and Deep Creek. Camp O'onga is directly off State Highway 18 and no travel along low-standard dirt roads or through locked gates is required. In fall 1991, Camp O'onga was placed under new ownership. However, the staff in the summer of 1991 were very cooperative and the camp has had a history of allowing access to the camp and the ridge for research purposes. An air pollution monitoring station has been maintained at the camp for some years (Miller et al 1989); a biologist studying squirrels frequently visited the ridge through this camp (Cotter, pers.comm.); the camp itself maintains a knowledgable forester on its staff (Glen Barley, staff member, 1991).

A second access point to the Fisherman's Camp cRNA is from Cedar Glen, a small crossroads on the east side of Lake Arrowhead on Highway 173. Hook Creek Road leads from Cedar Glen to the Lake Arrowhead Boy Scout Camps. A very good to low-standard dirt road leads from the Boy Scout Camps directly to the public campground at Fisherman's Camp. Permission to use this road, which is gated with Forest Service and other locks, must be obtained from the Los Angeles Council of the Boy Scouts of America (2333 Scout Way, Los Angeles, CA 90026). Forest Service personnel at the San Bernardino National Forest headquarters can provide the name and number of the Boy Scout contact person for this permission. Travel on the dirt road by a two-wheel drive vehicle is possible for some distance (the road was re-graded to serve fire and emergency vehicles fighting the Hook Fire in summer 1991); however, some distance from the public campground, the steep grade and soft powdery soil make travel impossible without 4-wheel drive. Fisherman's Camp Public Campground allows access to Deep Creek at the north end of the candidate RNA. The private road allows access to the ridge.

Access is also possible from the east by following a 2 mile trail (3.2 km) from Crab Flats to Deep Creek at Fisherman's Camp Public Campground. This trailhead is reached by

travelling 3 miles (4.8 km) north on Green Valley Road (2 miles/3.2 km east of Running Springs on State Highway 18) to Forest Service road 3N16. This road leads past the Crab Flat Campground (at the 3 mile/4.8 km point), west to the Crab Flat trailhead (approximately 4 miles/6.4 km from Green Valley Road). This route is not particularly recommended as the 4 mile (6.4 km) roundtrip from Crab Flat trailhead to Fisherman's Camp is relatively steep and adds significantly to a researcher's travel time.

Finally, cross-country travel from the end of Wilderness Road at the north side of Running Springs allows difficult and steep access to the southern end of the site. Near the southern boundary of the Fisherman's Camp cRNA, a dirt road runs to a pumping station in Sidewinder Canyon maintained by the Running Springs Water Company. The water company may allow access along this road for research purposes. This road is not marked on topographic maps.

Within the site boundaries, travel is relatively easy through the generally open understory of the coulter pine forest. However, slopes are quite steep and, as is customary in backcountry travel, water must be carried.

ADMINISTRATIVE LOCATION

The proposed Fisherman's Camp Research Natural Area includes portions of Sections 20 and 29 in Township 2 North, Range 2 West, just north of Running Springs, San Bernardino County. The study area is covered by the KELLER PEAK, CALIF. U.S.G.S. topographic map (1:24,000; 7.5 minute, 1990). See Map 3: Topographic Map. The site is south and east of Fisherman's Camp, a popular public campground and the feature for which the cRNA area is named. The Fisherman's Camp candidate RNA lies wholly within the Arrowhead Ranger District of the San Bernardino National Forest. District offices are at the ~~Mill Creek~~ Arrowhead Station in ~~Mentone~~ Skyforest, California; Forest Headquarters are in San Bernardino, California.

JUSTIFICATION

In the transmontane region of California, *Pinus coulteri* forms an open forest or woodland that is typically transitional between the chaparral belt and the lower montane coniferous forests. Although most of the higher elevation coniferous forests of the San Bernardino Mountains are southern equivalents to the widespread montane coniferous forests of the Sierra Nevada and are therefore considered to belong to the Sierran Floristic Province, coulter pine (*Pinus coulteri*) is absent from the Sierra Nevada. Ranging from the San Francisco Bay Area south down the Coast Ranges, and through the Transverse and Peninsular Ranges of southern California, the coulter pine forest is considered a component of the Pacific coniferous forest. Tree associates vary from *Pinus sabiniana* and *Pinus ponderosa* in the northern part of its range; *Abies bracteata* in the Santa Lucia Mountains of central California; and *Pinus*

ponderosa, P. jeffreyi, Quercus kelloggii, and *Q. chrysolepis* in southern California. Farther south in the Peninsular Ranges, the range of *Pinus coulteri* extends to the north end of the Sierra San Pedro Mártir in Baja California (Thorne 1977).

In the San Bernardino Mountains, *Pinus coulteri* occurs in a broad ecotone between the chaparral and the yellow pine forest. *Pinus coulteri* is considered a "true" chaparral conifer; populations are typically found as scattered overstory trees in brush fields. Specially adapted to this flammable habitat, the very large *P. coulteri* cones (at up to 5 pounds each, the largest North American pine cone) are persistent and remain closed until December, well after the fire season, increasing the possiblity of viable seed and germination the following spring (Critchfield in Minnick 1976). Coulter pine is known to survive light fires and to reproduce well after the hot fires that periodically ravage the chaparral vegetation with which it is associated.

At several sites north of Lake Arrowhead, here in the vicinity of Running Springs, and again to the southeast near Barton Flats, a marginal forest dominated by *Pinus coulteri* and *Quercus kelloggii* occurs on slopes between 4500-6000 ft. (1360-1830 m). Although this forest type, dominated by a chaparral conifer and a forest hardwood, has only a local distribution in the San Bernardino Mountains, it is widespread in the Peninsular Ranges of southern California, especially in the Mt. Palomar, Julian-Wynola, Cuyumaca, and San Jacinto Mountain regions. More unusual is a forest of *Pinus coulteri* and *Quercus chrysolepis*, found at only three locations in the San Bernardino Mountains: here above Deep Creek at Fisherman's Camp cRNA, near Barton Flats, and on the south faces of Keller Peak and Bear Canyon (Minnick 1974).

In 1969 and 1974, the vegetation of the San Bernardino Mountains was mapped on eighteen 1:24,000 and 1:62,500 USGS topographic maps (Minnick, 1969 and 1974). Working from infrared aerial photographs (using Kodak Ektachrome Infrared Aero (CIR) Types 8443 and 2443), a highly generalized vegetation map of the San Bernardino Mountains was produced. This general vegetation map clearly shows overall trends and relationships between vegetation types, especially the horizontal banding of plant communities in response to elevational change (Map 4: General Vegetation Map of the San Bernardino Mountains). In his description of the vegetation of these mountains, Minnick (1976) treats the coulter pine forest as a variant of both the "Conifer Forests in Chaparral" and "Marginal Forests". As is apparent in areas highlighted by color in Map 5: Coulter Pine Forests and Woodlands in the San Bernardino Mountains (Minnick 1976), these forests are scattered between 2800-7500 ft. (850-2400 m).

As noted in the site description, the candidate Fisherman's Camp Research Natural Area includes, in addition to the *Pinus coulteri-Quercus chrysolepis-Quercus kelloggii* forest, a variety of trees characteristic of the ponderosa pine forests of the San Bernardino Mountains. At the eastern boundary of the site, along Deep Creek and along drainages of the northeast-facing slope at Fisherman's Camp cRNA, a rich broadleafed riparian forest, dominated by

Alnus rhombifolia and *Cornus spp.* together with many herbaceous associates, contributes to the overall habitat diversity of the area. Mountain dogwood (*Cornus nuttallii*), a rare riparian associate in the San Bernardino Mountains and found only in a few watercourses in the vicinity of Lake Arrowhead and Lake Gregory (Minnick 1976), occurs here at Fisherman's Camp. *Streptanthus bernardinus*, the Laguna Mountains jewel flower, was collected at the site; *Castilleja montigena*, Heckard's Indian Paintbrush, may occur here as well. The southern rubber boa, *Charina bottae umbratica*, is known from along Deep Creek; the San Diego horned lizard, *Phrynosoma cornatum blainvillei*, has been reported from the dry west-facing slopes near the ridge.

II. PHYSICAL FEATURES

GEOGRAPHY

Along with the San Gabriel Mountains to the west, the San Bernardino Mountains are included within the Transverse Range geomorphic province of California. Running eastward from Santa Barbara to the Mohave-Colorado deserts, the Transverse Range is an important transition zone between the floristic elements of northern and southern California (Hanes 1975). The northern portion of the range rises gradually from the valley floor on the west at 5000 ft. (1500 m) to form a gentle, undulating crest area that gradually increases in elevation to 7850 ft. (2400 m) north of Big Bear Lake. This area of relatively low relief and gentle hills and deep soils is an old-age surface, dating back to the early Quarternary. From Big Bear Lake, the crest of the San Bernardinos veers southeast to the highest portion of the range where the Santa Ana River and Mill Creek drain two prominent ridges on the main mountain plateau (Minnick 1988). Here the San Bernardino Mountains reach their highest elevation on the prominent San Gorgonio Mountain at 11,502 ft. (3508 m).

Fisherman's Camp candidate Research Natural Area is in the northwestern portion of the San Bernardino Mountains. While elevations in this region are not particularily high, the topography can be quite rugged where streams cut steep-sided canyons through the upland surface. Deep Creek, running to the north, cuts an impressive channel through the north-slope country of the San Bernardino Mountains. To the south of Fisherman's Camp cRNA, State Highway 18, aptly named the Rim of the World Highway, winds on the edge of the upland surface (at 6000 ft./1830 km at Running Springs) along a steep southern escarpment of rugged canyons that plunge 4500 ft. (1400 km) to the San Bernardino valley floor in just 4 to 5 miles (6 to 8 km).

Elevations within the candidate Research Natural Area range from 6036 ft. at the high point along the ridge on the western boundary to 5020 ft. beside Deep Creek (1841 m to 1530 m). Slopes vary from 5° on the portions of the ridgetop that are nearly level to 38° along the steep terrain above Deep Creek. Two intermittent streams, tributaries of Deep Creek, drain Fisherman's Camp along the generally east-facing slopes.

CLIMATE

As in most of California, vegetation in the San Bernardino Mountains is influenced primarily by the infrequent winter rains and prolonged summer drought typical of a dry Mediterranean climate. Within the mountains, the varied terrain and elevation produce a wide range of local climatic conditions. As winter storms move into southern California, moist southern winds travel in advance of incoming cold fronts. As this moisture-laden air moves up the slopes of the San Bernardino Mountains, precipitation increases from 15" (38 cm) annual

precipitation in San Bernardino at the western edge of the mountains to 40" (100 cm) annual precipitation at the crest of the range. In the lee of the San Bernardino Mountains, a pronounced rainshadow effect occurs and precipitation decreases to less than 8" (20 cm) annually on the low elevation slopes bordering the Colorado and Mohave Deserts. During the dry season (April to November), storm activity nearly ceases except for occasional afternoon thunderstorms in July and August over the San Gorgonio crest region and in Big Bear Basin.

Much of the precipitation that occurs in the mountains falls as winter snows that accumulate in the mid- and high elevation coniferous forests. Here, a heavy snowpack ensures that soil moisture replenishment is delayed until the late spring melt frees the water at the beginning of the early summer growing season (Minnick 1988).

As mentioned above, Fisherman's Camp candidate Research Natural Area is east of Lake Arrowhead, a site with 42 years of year-round weather records. Accurate weather data is available from the National Climatic Data Center, although it is not published in the printed monthly and yearly summaries for California. The nearest year-round weather station is the fire station at Lake Arrowhead (Site Index #4671, Division 7, 34°15'N, 117°11'W) at 5210 ft. (1585 m), a station similar in character, elevation, although not in vegetation type, to Fisherman's Camp. As the nearest station, its records are included here.

Based on records from 1948-1988, the average precipitation at Lake Arrowhead is 40.17" (102 cm) yearly. Snowfall averages 61"/year (155 cm), but reached a high of 183" (465 cm) in 1952 and a low of 6.5" (16.5 cm) of snow nine years later in 1961. Winters and summer temperatures in this region of the San Bernardino Mountains are comparatively mild for a mountain environment: average temperatures range from 38° to 68°F (3° to 20°C), with extremes ranging from a winter low of 8°F (-13°C) to a summer high temperature of 106°F (41°C). High elevations and cool temperatures result in a short growing season between mid-June and mid-September of about 100 frost free days per year.

Additional climatic data is available to researchers who are willing to piece together information from a variety of sources. In Miller et al (1989), records from a precipitation station at Camp O'onga, south of the candidate RNA, are averaged for the years 1973-77; comparing similar records from the Lake Arrowhead Fire Department weather station for this same time period allows records from subsequent years to be adjusted for the Fisherman's Camp cRNA.

The San Bernardino County Flood Control Department maintains temperature and precipitation records from 3 sites nearby: in Running Springs, the Running Springs Fire Department has records from 1970-1989, and 1991 (Station # 5062/Auto) and the Running Springs 1E site (Station # 5184/Auto) includes records from 1931-38, 1943, and 1948-1989. Due east of Fisherman's Camp is a third site, Green Valley Lake with records from 1960-1986.

The US Forest Service Fire and Emergency Dispatch Center maintains temperature and precipitation records from a variety of stations for 6 months of the year (during fire season). The nearest station, called "Strawberry Peak" is located south of Lake Arrowhead at 6153

ft./1876 m (T2N, R3W, Section 30). Due to vandalism at Strawberry Peak, the Forest Service plans to move the weather station to Skyforest (T2N, R3W, Section 27). This information is called in daily and recorded manually in books; no summary information is available but could be calculated from the daily records. The manager of the Dispatch Center has calculated a Forest precipitation average from the 15 fire/weather stations in the San Bernardino National Forest that keep records. During 1991, the Forest average precipitation was 27.64" (70.24 cm). Other fire/weather stations in this portion of the San Bernardino National Forest include Rock ~~Creek~~ Camp Station and Big Pine Flat, both to the northeast and northwest, respectively, and at some distance from the candidate Research Natural Area; their records are therefore not included in this report.

GEOLOGY

Roughly 75 miles (120 km) east of Los Angeles, the San Bernardino Mountains are the highest and most rugged mountains of southern California. This very young mountain range consists of three primarily granitic blocks of Mesozoic age that have been uplifted along the San Andreas Fault on the south and along a complex network of thrust faults on the north. The last major period of mountain building occurred during the mid-Pleistocene (300,000-500,000 years ago) and caused the major uplift and westward tilting of the mountain blocks.

The San Andreas fault splits the main part of the range into two structural blocks which differ from one another by both origin and basement terrane material. The north block is eroded from an elevated mass of granitic basement rock that is part of the granitic batholith of the Mojave Desert. Geologically, it is considered part of the Mojave crustal block and, before uplift, was part of the Mojave Desert during Tertiary and early Quarternary time. Separated from the north block by the San Andreas fault system, the south block is primarily eroded from a gneiss and is similar to the rocks of the San Gabriel Mountains to the west, but unlike the rocks of the north block. The south block is divided into two slices by a diagonal branch of the San Andreas fault: the northeast slice is mountainous and contains Cenozoic sedimentary strata, while the southwest slice has low relief and no Cenozoic strata (Dibblee 1976).

The geology of the Fisherman's Camp candidate Research Natural Area is mapped as a single quartz monzonite of Cretaceous or Jussaic age (Map 6. Geologic Map; from Bortugno, E.J. and T.E. Spittler, 1986, compilers). This Mesozoic plutonic rock, known as the Pleasant View Ridge quartz monzonite, is widespread in this portion of the San Bernardino Mountains. No detailed description is available for this rock type or other rock types that may occur at Fisherman's Camp. The map included in this report includes the entire San Bernardino Quadrangle (1:250,000); notation is made on the compiled map of a geologic map of the Redlands Quadrangle (1:62,500) by Dibblee (1968). This Redlands map has never been

completed and only a pencil sketch is available from the California Division of Mines and Geology. It maps the entire region surrounding Fisherman's Camp as a quartz monzonite and shows no faults in the region. No text accompanies this preliminary map.

SOILS

Detailed soil inventories of the Fisherman's Camp Area are not available. Although the USDA Soil Conservation Service has completed detailed maps of the southwestern part of San Bernardino County (Woodruff and Brock 1980), San Bernardino National Forest lands form the northern and eastern boundaries of the survey and are unmapped. However, the US Forest Service has released a draft version of an Order 3 Soil Resource Inventory (SRI) for the San Bernardino National Forest (Retelas 1980). This reconnaisance inventory was compiled to provide forest-wide information. Because most soil types were mapped by photo-interpretation and little ground-truthing was included in the inventory process, the resolution of the mapping was very low (that is, the minimum mapping area is about 100 acres or 40 ha). This SRI is not suitable for site-specific planning for Fisherman's Camp. Nonetheless, this inventory is the best information available at this time and is included here to aid subsequent researchers (Map 7: Soil Map).

The proposed Fisherman's Camp Research Natural Area is mapped as a single soil type: the Wapi-Pacifico families-Rock outcrop complex (DaG). This complex occurs on slopes with very steep relief (50 to 75 percent slope). These soils, composed of 30% Wapi family and 30% Pacifico family, are a soft shallow sandy loam with a highly weathered fine to very fine granular structure. The surface soils are 0" to 7" (0-18 cm), and the subsoils are relatively shallow, ranging from 10" to 15" (15-150 cm), and have weathered from decomposed granitic or granodiorite rocks. The danger of erosion is very high on these steep slopes. The effective rooting depth is 10-20" (15-50 cm). Coulter Pine, Canyon Live Oak and Ponderosa-Jeffrey Pine forests are the typical vegetation for this soil type. Intermixed with this soft powdery loam are rock outcrops (about 15% of this complex). These outcroppings are exposures of bare bedrock with only small inclusions of soil capable of supporting plants.

III. BIOLOGY

THE VEGETATION OF FISHERMAN'S CAMP

In 1975, Cheatham and Haller described a system of "natural communities" of California's landscape; this system has been revised several times by the California Natural Diversity Data Base. More recently, Holland (1986), working together with biologists knowledgeable about particular areas and community types, prepared a preliminary draft of the terrestrial natural communities of California. This listing of plant community types not only names the community, but describes the components of the vegetation, including characteristic species, site factors and geographic range.

Following Holland (1986), Fisherman's Camp candidate RNA contains components of several community types: Coulter Pine Forest (Element Code 84140); Westside Ponderosa Pine Forest (Element Code 84210); and White Alder Riparian Forest (Element Code 61510). The pine forest types overlap here to such a degree that it is difficult to map them as separate communities with discrete boundaries. They are therefore mapped as a single forest complex (Map 8: Vegetation Map of Fisherman's Camp candidate Research Natural Area). Working with negatives of aerial photographs, however, Minnick mapped the distribution of coniferous and hardwood forest trees as individual species for this report (Map 9: Distribution of Forest Tree Species at Fisherman's Camp Candidate Research Natural Area). These maps, if considered as a composite, indicate the overlapping local range of each tree species and illustrates the difficulty of assigning the highly variable nature of the forest within a particular area of of the site to a single Holland community type. Field checking these maps indicate that the boundaries of the individual tree species overlap even more than is indicated in the maps. Nonetheless, Holland's community types exist at other sites in the San Bernardino Mountains and elsewhere as discrete and identifiable units and are so included in this discussion.

The site is mapped as a single forest type that has elements of two vegetation types: the Coulter Pine Forest (Element Code 84140) and the Westside Ponderosa Pine Forest (Element Code 84210). Along Deep Creek and in steep narrow drainages at the southern end of the site, a narrow riverine forest occurs: the White Alder Riparian Forest (Element Code 61510). This forest is best considered as a southern Californian variant of Montane Riparian Forest (Element Code 61500).

Coulter Pine Forest (Element Code 84140)- Westside Ponderosa Pine Forest (Element Code 84210)

The steep slopes of the Fisherman's Camp candidate RNA support a complex coulter pine forest, where co-dominance in the tree layer varies with slope and exposure. Most of the

site is densely forested, with tree cover varying between 65-80% cover. *Pinus coulteri* is present along the ridge and on the eastern slopes, especially those with a south-facing exposure. It is more widespread at the site than mapped on Minnick's distribution map (Map 9). Several coniferous species share dominance at Fisherman's Camp cRNA: *Abies concolor* and *Pinus lambertiana* on north-facing slopes; and *Pinus ponderosa* and *P. jeffreyi* on warmer, south-facing slopes. Two hardwood trees are an important component of this forest: *Quercus chrysolepis*, which is more common at the northern end of the site, and *Q. kelloggii*, which occurs throughout the area. Although all these tree species are described as associates within Holland's Westside Ponderosa Pine Forest, here *Pinus ponderosa* is not the dominant tree species. Instead it is an occassional associate in this complex ecotonal forest that more typically occurs in a narrow elevational range transitional between two distinct forest types. Covering most of the ridge above Deep Creek, with tree species varying within short distances along environmental gradients, the forest has a distinctive and consistent, if highly variable, character. Reproduction of all tree species appears good and all age classes are present.

Throughout much of the site, the forest has an open park-like understory. Especially along the ridge, shrubs and herbaceous plants are few and scattered, including *Arctostaphylos pringleii* var. *drupacea, Eriogonum saxatile, Lotus nevadensis, L. crassifolius,* and *Carex multicaulis*. At the southern end of the cRNA, on south-facing slopes, *Pinus coulteri, Quercus kelloggii,* and *Pinus jeffreyi* co-dominate in an open forest (50% tree cover) with a diverse, if sparse (usually less than 10% cover) understory. *Agoseris heterophylla, Arctostaphylos pringlei* var. *drupacea, Calystegia fulcrata, Carex multicaulis, Chaenactis santolinoides, Epilobium* cf. *adenocaulon, Eriastrum densifolium* spp.*austromontanum, Eriogonum saxatile, Erysimum capitatum, Galium angustifolium, Iris hartwegii* ssp. *australis, Lathyrus laetiflorus* ssp. *laetiflorus, Lotus nevadensis, Lupinus andersonii, Penstemon bridgesii, Pyrola picta, Silene* cf. *verecunda* spp. *andersonii,* and *Streptanthus bernardinus* are among the herbaceous and shrubby associates. Where the forest is particularly open and soils are dry, bracken fern, *Pteridium aquilinum* var. *pubescens*, occurs here in dense patches, along with grass associates, including *Bromus ciliatus, B. tectorum,* and *Stipa latiglumis.* In particularly mesic areas, such as canyon bottoms, *Calocedrus decurrens* and *Cornus nuttallii* occur among the other forest trees. *Rubus parviflorus,* the thimbleberry shrub, is a common shrub on these cool shady slopes.

White Alder Riparian Forest (Element Code 61510)

Along the edges of Deep Creek and in the narrow canyons of intermittent tributaries, a rich dense riparian forest occurs. Although covering a relativley small acreage, this vegetation adds greatly to the diversity of plants at the site and provides valuable habitat for many wildlife species. The White Alder Riparian Forest is a streamside deciduous forest dominated by *Alnus rhombifolia* and is best developed in the San Bernardino Mountains along swiftly flowing, well aerated perennial streams. Here Deep Creek runs in a constricted

channel and its waters cascade among huge boulders. Occasionally, the creek widens and forms quiet pools. Throughout the Deep Creek riparian forest, the shrubby understory includes *Cornus stolonifera*, *Rosa woodsii*, *Rhamnus californica*, *Rubus parviflorus*, and *Salix lasiolepis* amidst a dense herbaceous layer of annuals, perennials, and vines. At Fisherman's Camp, these include, among others: *Clematis ligusticifolia*, *Aquilegia formosa*, *Artemisia douglasiana*, *A. ludoviciana*, *Barbarea orthoceras*, *Erodium* sp., *Galium angustifolium*, *Geum macrophyllum*, *Gilia splendens*, *Lepidium virginicum* var. *pubescens*, *Lepidium virginianum*, *Juncus* spp., *Lilium* cf. *humboldtii*, *Claytonia perfoliata* var. *perfoliata* and *Urtica holosericea*. Grasses include *Agropyron parishii*, *Bromus carinatus*, and *Bromus tectorum*. On the steep, drier slopes of Deep Creek Canyon away from the water, *Abies concolor* and *Pinus lambertiana* occur; *Ceanothus integerrimus*, *Phacelia curvipes*, *Phacelia imbricata*, *Lotus* spp., and several *Penstemon* are found on these canyon slopes.

TABLE 1. Extent of the Vegetation Types of Fisherman's Camp, San Bernardino County.

These acreage estimates are based on the Vegetation Map (Map 8) of Fisherman's Camp. As noted in the text, the Coulter Pine Forest and Western Ponderosa Pine Forest are mapped as a single unit as they intergrade imperceptibly with one another.

Coulter Pine Forest-Westside Ponderosa Pine Forest	365 acres (146 ha)
White Alder Riparian Forest	66 acres (26 ha)

VEGETATION SAMPLING AT FISHERMAN'S CAMP

In 1989, Dr. Andrew Sanders, along with an assistant, Jennifer Lyman, sampled the vegetation at Fisherman's Camp. Three belt transects, each 50 m long and 10 m wide, were established on the site in areas where access was reasonable. Once a general area was selected for sampling, a randomly selected compass bearing was used to set the transect location. Each 500 m^2 transect was sampled with 10 subplots (5 m X 10 m) in order to measure the amount of variation in the vegetation at the sampling site. Only two transects are included in this report as the data from subplots 6-10 of Transect #2 were not included in the Fisherman's Camp files received from Sanders.

The name of each species occurring within each subplot was recorded. In the herbaceous layer, all plants were simply recorded and counted. For woody species, such as trees and shrubs, the height was measured, as well as dbh (for tree species) and two diameter measurements of the crown. Crown cover is calculated by the "Crown-Diameter Method",

using the formula cc = (Diameter 1 + Diameter 2 /4)$^2\pi$. The first diameter measure was taken at the longest axis of the crown; the second, at a right angle to the first measurement.

Cover is usually defined as the vertical projection of the crown to the ground surface and is generally expressed as a percent of the total sampling area. Cover is considered to have greater ecological significance than density, as it gives a better measure of plant biomass than does the number of individuals. Mueller-Dombois and Ellenberg (1974) emphasize the importance of plant biomass to community analysis when they note:

> Plant biomass has a major influence on the stand climate in terms of light and temperature relationships. It influences the water relations through rainfall interception and transpiration rate per unit area, and it is closely related to the volume of circulating nutrients in the ecosystem. Moreover, the amount and characteristics of the plant biomass are of direct importance to the animals associated with the vegetation, because the plant biomass provides their shelter and food.

Computer analysis of the transects, calculating percent cover for the dominant species, are presented in Table 2.

Transect Descriptions

SITE 1. This relatively open forest is charaterized by a shared dominance of the tree species *Abies concolor*, *Quercus kelloggii*, *Quercus chrysolepis*, *Pinus coulteri*, *Pinus jeffreyi*, *Pinus lambertiana*, and *Pinus ponderosa*, which together make up 37.8%. *Ceanothus integerrimus* is a common shrub of the open understory; associated plants include *Streptanthus bernardianus*, *Poa fendleriana*, and *Arctostaphylos pringlei*.

SITE 3. This open site is dominated by *Quercus kelloggii* and *Pinus coulteri*, with an understory of *Pteridium aquilinum*. Associated tree species include occassional *Abies concolor*, *Pinus lambertiana*, and *Pinus ponderosa*.. The understory is sparse and there is a considerable amount of bare ground. Associated herbaceous species are *Clarkia rhomboidea*, *Bromus tectorum*, *Erysimum capitatum*, *Phacelia imbricata*, and *Iris hartwegii*.

TABLE 2. Summary Table of Sander's Fisherman's Camp Transects, June 1989.

	Site 1	Site 3
LOCATION	unknown for both transects.....	
OBSERVERS	Lyman and Sanders	Lyman and Sanders
DATE OF FIELD WORK	Summer 1989.....	
PLOT SIZE	500 m sq.	500 m sq.
TOTAL PLANT COVER	220 m sq.	79 m sq
PERCENT COVER	44%	16%

The following information summarizes the percent cover information for the species which have the highest percent cover in the transects.

SPECIES NAME	SITE 1	SITE 3
Abies concolor	6.1	0.15
Ceanothus integerrimus	7.8	0.11
Pinus jeffreyi	0.8	-
Pinus coulteri	1.9	5.11
Pinus lambertiana	6.1	0.15
Pinus ponderosa	4.2	-
Pteridium aquilinum	-	4.94
Quercus chrysolepis	6.7	-
Quercus kelloggii	12.0	7.23

SENSITIVE PLANT SPECIES OF FISHERMAN'S CAMP

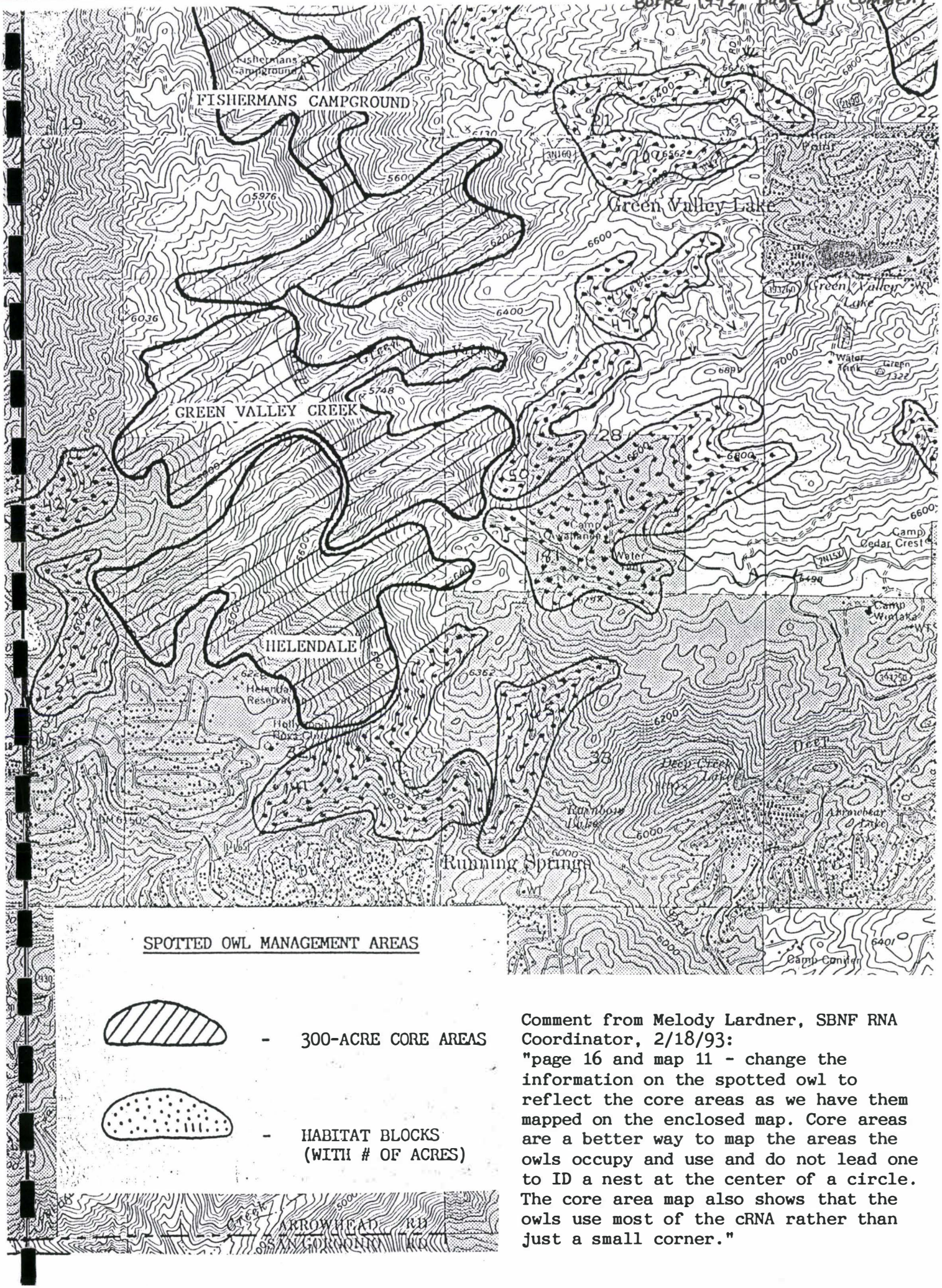
Although they have no formal state or federal status, two plants found at Fisherman's Camp candidate Research Natural Area are listed by either the US Forest Service, the California Native Plant Society, or the California Natural Diversity Data Base as sensitive or "special" plants.

Streptanthus bernardinus, the Laguna Mountains jewel flower or the San Bernardino butterweed, was collected at Fisherman's Camp candidate Research Natural Area among the sparse herbaceous vegetation on dry powdery slopes in the Coulter Pine-Westside Ponderosa Pine Forest. Although not numerous, the plant was noted frequently during field work in both 1989 and 1991. This glaucous perennial with its constricted white flowers is found from the San Gabriel Mountains to the Laguna Mountains between 4000-7000 ft (1200-2100 m) and is listed as a sensitive plant by the US Forest Service. The California Native Plant Society (CNPS) assigns this plant to List 1B: Plants Rare, Threatened or Endangered in California or Elsewhere. *Streptanthus bernardinus* has a R-E-D (Rarity-Endangerment-Distribution) Code of 2-1-3, that is, its occurrance is confined to several populations or one extended population; it is not endangered; and it is endemic to California. This plant is not federally listed as rare or endangered, as it is considered too widespread and/or not threatened (Code C3c); the State of California has not assigned it to any category. The Natural Diversity Data Base has records of this *Streptanthus* from a nearby ridge southwest of Green Valley, but not from Fisherman's Camp (Map 10: Distribution of Special Plants and Animals in the Fisherman's Camp cRNA).

A *Castilleja*, tentatively identified by Sanders as *C. montigena*, was found at Fisherman's Camp cRNA. Additional collecting will be required to verify its identification. *Castilleja montigena* [syn. *C. martinii* var. *ewanii*], Heckard's Paintbrush, has been included by CNPS on List 4: Plants of Limited Distribution, the so-called "watch list". This plant is endemic to the San Bernardino Mountains between 5000-9000 ft. (1525-2745 m) and is typically found in clay openings on either pebble plains or in the forest-meadow ecotone of upper montane coniferous forest. *Castilleja* cf. *montigena* was recorded by Sanders in the 1989 survey of the Fisherman's Camp candidate RNA. This recently described Indian Paintbrush (Heckard et al 1980) was not collected during the ~~most~~ summer 1991 survey.

FAUNA OF FISHERMAN'S CAMP

No detailed studies of the fauna of Fisherman's Camp are available. Lists of amphibians, reptiles, birds and mammals that may occur on the site are available upon request from the Forest Wildlife Biologist at San Bernardino National Forest Headquarters. Using the Statewide Wildlife Habitat Relationship System (Timossi 1989), a database system originally programmed for Pacific Gas and Electric and now maintained by the State of California Department of Fish and Game, it is possible to "filter" the names of the wildlife that may



Comment from Melody Lardner, SBNF RNA Coordinator, 2/18/93:
"page 16 and map 11 - change the information on the spotted owl to reflect the core areas as we have them mapped on the enclosed map. Core areas are a better way to map the areas the owls occupy and use and do not lead one to ID a nest at the center of a circle. The core area map also shows that the owls use most of the cRNA rather than just a small corner."

occur at a particular site by carefully listing the physical and biological characteristics of the site. It is, however, essential that an experienced wildlife biologist review the list for obvious errors of inclusion or exclusion. I am grateful to Mr. Steve Loe for the list that appears as Appendix C: Predicted Wildlife Species of Fisherman's Camp: A Preliminary Checklist. The list generated by the database based on the site characteristics I submitted was reviewed by Loe and many unlikely species were eliminated based on species information included in "California's Wildlife, Volumes 1-3" (Zeiner, et al 1988). The presence of these species should be verified by subsequent ground surveys.

Dr. Bill LaHaye, a biologist surveying spotted owls in the San Bernardino Natural Forest, noted the territory of the spotted owl (*Strix occidentalis* ssp. *occidentalis*), a Forest Service Sensitive Species and a California "species of special concern", as occurring near the cRNA. The territory of this bird occurs nearest to the cRNA in Section 29, near Deep Creek along the proposed eastern boundary of the site (Map 11). It is unlikely that the establishment of an Research Natural Area will adversely affect the species; instead, the presence of these birds nearby enhances the value of establishing of an RNA in this area.

In 1990, a nine month study was conducted by Kevin Cotter (pers. comm.), then a Masters student, on the western gray squirrel populations of the ridge and slopes between Camp O'onga and Deep Creek. This study attempted to estimate the size of the population of this site during three seasons and compare the population differences between the "pine-fir forest" of the north slopes and the "pine-oak" forests of the south slopes. A copy of the unpublished work was submitted by Cotter for this report and has been sent on to the Arrowhead District wildlife biologist for inclusion in USFS files.

Two reptiles of interest have been reported from the Fisherman's Camp candidate RNA. The southern rubber boa (*Charina bottae umbratica*), restricted to the San Bernardino Mountains, has been recorded at Deep Creek and at several locations outside the cRNA boundaries (Map 10). This snake is found in a variety of montane forest habitats, especially in the vicinity of streams or wet meadows as it requires loose, moist soil for burrowing. It often seeks cover in rotting logs. A population of the San Diego Horned Lizard (*Phrynosoma coronatum blainville*), typically a coastal sage scrub species, occurs at the northwestern tip of the candidate RNA and in Section 19 in the vicinity of Sheep Creek.

IV. LAND USE

PREHISTORIC LAND USE OF THE SAN BERNARDINO MOUNTAINS

The earliest known population to inhabit the San Bernardino Mountains were a native people who were given the name *Serrano*, or "mountaineer", by the Spainards. This tribal people are classified by ethnographers as members of the Southern California branch of the Shoshonians. In the mountains, the Serranos settled on a semi-permanent basis in large villages near reliable sources of water and within gathering range of the plants and wildlife that the people depended upon. Three Serrano village names are reported from the Big Bear area: Yuhaviat ("Pine Place"), Kayahpiat, and Achavat. Seasonal camps were also established and used by Serranos during the harvest times of their important plant foods, which included chia seeds, acorns, and pinyon nuts. Numerous grinding stations are reported from these satellite camps. There is some evidence that these mountain villages may have been occupied year round. In addition to these permanent villages, however, foothill clans are known to have visited the mountains seasonally, probably for hunting and pinyon and acorn harvest (various sources cited in Robinson 1981).

The Serranos were hunters and gatherers and followed a seasonal cycle of harvest from springtime gathering of tubers and greens, summertime seed collection, and fall pinyon and acorn harvests. Although more than 200 plants were used for food and medicinal purposes, the primary plant foods for the Serrano were acorns, pinyon nuts, and seeds from chia, buckwheat and sage plants. Deer, mountain sheep, rabbits and other small mammals were hunted by the men of the villages and this meat supplemented the plant foods gathered by the women. Food-gathering trails, hunting trails and trading routes crisscrossed much of the San Bernardino Mountains, including the ancient Mohave trail, and allowed travel within the mountains as well as trade between desert Indians and the peoples of the mountains and coastal plains beyond.

No archeological sites have been reported from the Fisherman's Camp candidate Research Natural Area.

HISTORIC LAND USE OF THE SAN BERNARDINO MOUNTAINS

The first recorded European to have reached the San Bernardino Mountains was a Spanish soldier, Pedo Fages, who in 1772 pursued army deserters across the mountains and into the Colorado desert. In 1776, Fray Francisco Hermenegildo Garces crossed the San Bernardino Mountains from the lower Colorado River to Mission San Gabriel along the Mojave trail. By the 1820s, the Spainards and the Californios (i.e., Mexican Californians) were engaged in agriculture in the San Bernardino Valley to the south of the mountains. They built an irrigation ditch from Mill Creek to irrigate their lands, the earliest known use of water from

the San Bernardino Mountains. Aside from some water use and small-scale lumbering, the Spaniards and Californios had little impact in the mountains.

The 1840s were the beginning of significant European impact in the San Bernardino Mountains. The Wilson expedition, in 1845, took a band of soldiers into the mountains in pursuit of cattle rustlers. The name of Bear Valley dates back to Wilson's description of the upland country (Robinson 1981; quoted from Woodward 1934).

> Before arriving at the lake we captured a village. The people of which had all left except two old women and some children. On the evening of the second day we arrived at the lake, the whole lake and swamp seemed alive with bear.
>
> The 22 young Californians went out in pairs and each pair lassoed one bear, and brought the result to the camp so that we had at one and the same time eleven bears.
>
> This prompted me to give the lake the name it now bears.

This expedition opened up a part of the range that was little known by European settlers before. During these years, the mountains became known by the name they are called today: the San Bernardinos. In the late 1840's, Mormon settlers in the valley town of San Bernardino began lumbering in the mountains to provide for the town's building needs.

Lumbering and sawmills remained an important early use of the San Bernardino Mountains long after the Mormons returned to Utah in 1857. At the turn of the century, logging remained an important industry in the San Bernardino Mountains. A logging train once ran from Running Springs, just south of the Fisherman's Camp cRNA, to sawmills. A spur camp existed at Washerwoman Flat. Physical evidence of logging at the Fisherman's Camp cRNA still remains, including old cables once used to pull logs from the forest with donkeys and logging chutes along which logs were slid to pick up points. The Brookings Box Company operated in this area and harvested heavily from this ridge to produce wood for orange crates. Mostly pines and firs were removed from the site (Barley, forester at Camp O'onga, pers.comm.).

Further to the east, gold became another magnet that lured people into the San Bernardino Mountains. A discovery of gold in 1860 in Holcomb Valley precipitated a gold rush that pulled hundreds of men into the mountains and initiated the building of roads, housing and stores.

Water next attracted the growing population of southern California into the mountains and, in 1884, a consortium of businessmen from Redlands built a dam in Big Bear Valley that created the present-day 8 mile long Big Bear Lake. Lake Arrowhead, west of Fisherman's Creek cRNA, was built in much the same way, with investors from Ohio, organized as the Arrowhead Reservoir Company, building a dam across Little Bear Creek in 1908. Tunnels were dug to divert the northward flow of the water south to the San Bernardino Valley. The state supreme court ruled that waters could not be diverted from one watershed to another and the irrigation project failed. However, Little Bear Lake remains, renamed as Lake Arrowhead in 1922 (Robinson 1979).

In recent times, recreation has been the most important draw that pulls people into the

San Bernardino Mountains. The first mountain resort as built at Big Bear Lake in the 1890's; by the 1920s, many resort communities were subdivided and built, including Lake Arrowhead, Crestline, Lake Gregory, and Running Springs, among others. Ski areas followed and the San Bernardino Mountains now receive about seven million visitors annually, making them one of the most heavily visited mountain regions in the United States.

IMPLICATIONS OF RECENT AND CURRENT USE AT FISHERMAN'S CAMP

The lands to the north and east of the candidate Research Natural Area are ~~owned~~ managed by the US Forest Service. Although the area that includes the cRNA is closed to the shooting of rifles, pistols, and bows and arrows yearlong, Deep Creek forms the boundary for this Forest Service restriction. Lands to the south and west of the proposed RNA are held privately (Boy Scouts of America, Camp O'onga, Running Springs Water Company, and perhaps others). Campsites occur outside the RNA in the vicinity of Fisherman's Camp, but have only a local impact. Hikers and equistrians from surrounding camps for boys and girls, as well as from the local towns, use this ridge frequently, but have little impact.

Air pollution is a significant hazard to the coniferous species of this area. Both short and long term studies are underway to identify and quantify the chronic effects of oxidant air pollutants in the mixed conifer forest, of which *Pinus ponderosa* and *P. jeffreyi* are important elements. The San Bernardino National Forest has been exposed to an increasing annual dosage of photochemical oxidants during the last three to four decades as industrial and urban growth in the South Coast Air Basin has expanded at an explosive rate. The National Forest, located at the east end of the South Coast Air Basin, is subjected to an ebb and flow of polluted air from developed areas on the valley floor, as diurnal "pumping" of high desert air and marine air occurs in the Basin. In the morning, air flows from the east to the coastal regions and, as the day warms, marine air laden with oxidant pollutants is delivered to the San Bernardino National Forest (Taylor, O.C., ed. et al 1980). In the late 1950s, ozone damage to ponderosa pine (*Pinus ponderosa*) was first recognized. Other coniferous trees are also susceptible to damage from air pollutants.

In 1974, the Statewide Air Pollution Research Center established 18 plots in the San Bernardino National Forest to measure the relationship between tree growth and crown condition, as well as to conduct an analysis of succession of forest trees at these permanent plots. At each of these permanent plots, a 150 or 200 m centerline was established and all forest trees more than 4" (10 cm) in diameter and within 20 m of each side of the centerline were included in the study. The tree conditions were measured every August during the early years of the study; now the sites are checked approximately once every 5 years. A soil analysis is done as well. The permanent plot nearest the candidate Research Natural Area is at Camp O'onga. This site may soon be removed from the study, as the private owners of the land have topped some of the trees in the study plot for use as Christmas trees (Miller,

pers.comm.). Preliminary results of this study were published in 1980 (Taylor, O.C., ed.) in a very detailed form, but did not summarize the degree of damage each tree or forest type experienced. A more recent publication (Miller et al 1989) notes trends of ozone damage to coniferous forests during a 14 year period (1974-1988).

FIRE HISTORY

Although requested from the supervisor's office, no fire history maps of this area were received. However, all computerized records of recent fires were searched by the Mr. Jerry Wilke of the Supervisor's Office. No fires were recorded since 1980 within the proposed boundaries of the candidate RNA. Long-time residents in the area recall a fire on the ridge in the late 1950's (1956 or 1957).

Since the early 1900s, a policy of fire suppression has been in place in the San Bernardino Mountains. Researchers question whether the large canopy fires of recent decades are a product of fire management or a natural event. Some believe that stand-thinning fires are required to maintain viable forests. However, canopy fires did occur locally in southern California mountains (Minnick 1991, Minnick 1988). Minnick (1991) believes that fire is an important force in shaping the distribution of conifer forest communities as fire intervals in southern California forests are shorter than the life spans of the trees, and thus must be an important factor in tree mortality and recruitment rates.

As noted above, *Pinus coulteri* is considered a fire-adapted species. Although coulter pine has closed cones, unlike the serotinous cones of *Pinus attenuata*, they do not require fire to open. These cones, requiring two years to mature, open in late winter (January-February in southern California) which may help protect seeds from summer and autumn fires. *Pinus coulteri* saplings grow rapidly through a shrub canopy and produce cones within 10-20 years. In San Diego County, researchers have noted that *Pinus coulteri* forests are being replaced by chaparral, presumably due to fire suppression policies (various authors in Minnick, 1991). Coulter pine has a lower mortality from fire where, as at Fisherman's Camp cRNA, it is associated with *Quercus chrysolepis* and *Q. kelloggii*, instead of chaparral. A coulter pine study in Santa Barbara county across a chaparral to woodland transition shows a decrease in cone serotiny in *P. coulteri*, suggesting that strong selection may exist for the natural variation in cone habit (Borchart 1985, in Minnick 1991).

V. RECOMMENDATIONS

RESEARCH NATURAL AREA BOUNDARIES

The boundaries on all the maps included in this report are essentially the same as those recommended in the Reconnaissance Report (Horton 1983) which accompanied the purchase order for this report. These boundaries are generally set by a road to a public campground at the north end, private lands to the west and south, and by Deep Creek to the east. It would be ideal to include more of the eastern watershed of Deep Creek in this area, or at least both sides of the creek; however, as Deep Creek itself is the boundary for restrictions on firearms, etc., it is better to exclude the unrestricted areas from the cRNA. This site forms a reasonably coherent research unit that would protect a very interesting and complex, if not typical, forest within its boundaries. As noted earlier in this report, Fisherman's Camp cRNA has excellent access along trails and roads; within the site boundaries, travel would be relatively easy for researchers with equipment through the steep but open terrain.

MANAGEMENT CONCERNS

The frequent use of the trails along the ridge by hikers and trails along Deep Creek by fishermen and campers must be considered by managers. However, it is important to note that the San Bernardino Mountains are the mostly heavily visited mountain area in the United States and it is unlikely that a *Pinus coulteri* forest site with good access will be found that has little or no visitation. Researchers should be encouraged to site equipment and experiments at some distance from trails to reduce the danger from vandalism. Vandalism has not been a problem at Camp O'onga, where the longterm air pollution study is underway.

Jurisdiction over only one bank of a creek is a management disaster waiting to happen; however, as the lands on both banks are ~~owned~~ managed by the US Forest Service, careful coordination at the district level may avoid serious mishaps. When a creek or river is included as part of a research area, it is ideal to protect as much of the watershed as possible. Obviously, logging the forest above Deep Creek on the slopes outside the cRNA would significantly and adversely affect any riparian-based research underway and affect populations of animals that range inside and outside of natural area boundaries. However, despite these comments, the coulter pine forest and not Deep Creek itself is the focus of this candidate Research Natural Area and it is therefore not essential to extend the boundaries to properly protect this site.

BIBLIOGRAPHY

AUTIER, BRENT

1967 A Regional Study of Mt. San Bernardino and Associated Areas. Quarterly of the San Bernardino County Museum Association, XIV, 3 & 4, p. 76-78.

BORCHART, M.

1985 Serotiny and cone-habit variation in populations of *Pinus coulteri* (Pinaceae) in the southern coast ranges of California. Madroño 32: 29-49.

BORTUGNO, E.J. and T.E. SPITTLER, compilers

1986 Geologic Map of the San Bernardino Quadrangle, 1:250,000. California Resources Agency, Division of Mines and Geology. Regional Geologic Map Series, Map No. 3A. 5 sheets.

CHEATHAM, N.H. and J.R. HALLER

1975 An Annotated list of California habitat types. in Major, J. and M.G. Barbour. Terrestrial Vegetation of California. Wiley Interscience.

COLLINGS, ADAM R.

1990 Arrowhead, Big Bear: the alps of Southern California. Arrowhead Mountain Books series, Anaheim, California.

DIBBLEE, Thomas W., Jr.

1968 Geologic Map of the Redlands quadrangle, California: US Geological Survey Open File Map, scale 1:62,500. OF 74-1022.

1971 Geologic Map of Lake Arrowhead Quadrangle, California: US Geological Survey Open File Map, scale 1:62,500.

1976 San Andreas Fault in Southern California. Calif. Div. Mines and Geology, Spec. Rept. 118, pp. 127-135.

HANES, TED L.

1976 Vegetation Types of the San Gabriel Mountains. in: Plant Communities of Southern California. June Latting, ed. California Native Plant Society Special Publication No. 2, p. 65-76.

HECKARD, L.R., M.I. MORRIS and T.I. CHUANG.

1980 Origin and Taxonomy of *Castilleja montigena*, Scrophulariaceae. Systematic Botany, Vol. 5, No. 1, pp 71-85.

HOLLAND, ROBERT

1986 Preliminary Descriptions of the Terrestrial Natural Communities of California. State of California Dept. Fish and Game, Non-game Heritage Program, Sacramento, CA.

HORTON, L.E.

1983 Reconnaissance Report: Proposed Fisherman's Camp Research Natural Area, San Bernardino National Forest. unpublished US Forest Service document, #4060.

LEADABRAND, RUSS

1964 A guidebook to the San Bernardino Mountains of California, including Lake Arrowhead and Big Bear Lake. Los Angeles: Ward-Ritchie Press.

MATTI, J.C., D.M. MORTON, and B.F. COX

1985 Distribution and geoloic relations of fault systems in the vicinity of the Central Transverse Ranges, southern California. USDA USGS Geological Survey, Open File Report 85-365.

MILLER, PAUL, J.R. McBRIDE, S.L. SCHILLING and A.T. GOMEZ

1989 Trends of Ozone Damage to Conifer Forests between 1974-1988 in the San Bernardino Mountains of Southern California. In: R.K. Olsen and A.S Lefohn (eds.). Effects of Air Pollution on Western Forests. A+WMA Transaction Series, ISSN 1040-8177, #16, p. 309-323. Air and Waste Mananagement Association, Pittsburg, PA.

MINNICK, R. A., L.S. BOWDEN and R. W. PEASE

1970 Mapping montane vegetation in southern California from color infrared imagery. USDA Contr. 14-08-0001-10674, Status Report III, Tech. Report III.

MINNICK, R.A.

1974 The influence of fire suppression on coniferous forest of southern California: A case study of the Big Bear fire, Nov. 13-19, 1970. In: Symposium Proceedings, Living with the Chaparral. Sierra Club, San Francisco.

1976 Vegetation of the San Bernardino Mountains. in: Plant Communities of Southern California. June Latting, ed. California Native Plant Society Special Publication No. 2, p. 99-124.

1988 The Biogeography of Fire in the San Bernardino Mountains of California. UC Publication Geography, vol. 28.

1991 Conifer Forest Fire Dynamics and Distribution in the Mountains of Southern California: A Landscape Steady-State Approach. Part 1. Crossosoma, Vol. 17, No. 1. Southern California Botanists, Fullerton, CA.

MUELLER-DOMBOIS, DIETER and HEINZ ELLENBERG

1974 Aims and Methods of Vegetation Ecology. John Wiley & Sons. New York. quote from pg. 81. 547 pp.

MUNZ, PHILIP A. and DAVID D. KECK

1968 A California Flora and Supplement. Univ. Calif. Press.

MUNZ, PHILIP A.

1974 A Flora of Southern California. Univ. Calif. Press.

NATIONAL CLIMATIC DATA CENTER

1990 Climatological Data: California Section. US Department of Commerce, National Oceanic and Atmospheric Administration, Asheville, North Carolina 28801-2676.

RETELAS, JAMES G.

1980 Order 3 Soil Resource Inventory of San Bernardino National Forest, California. USDA Forest Service and Soil Conservation Service.

ROBINSON, C.

1981 Unpublished Archaeological Reconnaissance Report #05-12-BB-18. USFS Big Bear Ranger District Headquarters.

ROBINSON, J.W.

1972 San Bernardino Mountain Trails: 100 Wilderness Hikes in Southern California. Wilderness Press.

1977 Mines of the San Bernardinos. La Siesta Press, Glendale, California.

1989 The San Bernardinos: the mountain country from Cajon Pass to Oak Glen: Two Centuries of Changing Use. Big Santa Anita Historical Society, Arcadia, California.

RUNDEL, P.W., D. J. PARSONS and D.T. GORDON

1988 Montane and Subalpine Vegetation of the Sierra Nevada and Cascade Ranges. Chapter 17 in Barbour and Major, *Terrestrial Vegetation of California.* California Native Plant Society. Special Publication Number 9.

SMITH, JAMES PAYNE, Jr. and KEN BERG

1988 Rare and Endangered Vascular Plants of California. California Native Plant Society.

STATE OF CALIFORNIA

1981 California Rainfall Summary. 1849-1980. Division of Planning, Department of Water Resources, Resources Agency.

TAYLOR, O.C., ed.

1980 Photochemical oxidant air pollution effects on a mixed conifer forest ecosystem. US Environmental Protection Agency, Ecological Research Series, EPA-600/3-80-002.

TIMOSSI, IRENE, programmer

1989 Statewide Wildlife Habitat Relationship Database System (version 8/8/89), California Department of Fish and Game, Resources Agency, State of California. (Originally programmed for Pacific Gas and Electric, 5/2/88)

UNITED STATES GEOLOGIC SURVEY

1975 Isoline map of mean annual precipitation in the California region. Published and revised by the USGS, Department of the Interior.

US WEST OPTICAL PUBLISHING

1988 Climatedata TD3200: Summary of the Day- Cooperative Observer Network (CD-ROM disk and software). 90 Madison Street, Suite 200, Denver, Colorado.

USDA-FOREST SERVICE

no date San Bernadino National Forest Land and Resource Management Plan. USDA Forest Service, Pacific Southwest Region. 3 vol.

VASEK, FRANK AND ROBERT THORNE

1977 Transmontane Coniferous Vegetation. In: Terrestrial Vegetation of California, ed. Barbour and Major. Wiley Interscience. Chapter 23, p. 797-832.

VAUGHAN, F.E.

1922 Geology of the San Bernardino Mountains north of San Gorgonio Pass [California]. California Univ., Dept. Geol. Sci. Bull., v. 13, no. 9, p. 319-411.

WOODRUFF, G.A. and W.Z. BROCK

1980 Soil Survey of San Bernardino County, Southwestern Part, California. USDA Soil Conservation Service with Univ.Calif. Ag. Experiment Station.

ZEINER, D.C., W.F. LAUDERSLAYER, K.E. MAYER, and M. WHITE, eds.

1988 California's Wildlife: Volumes 1-3. State of California Resources Agency, Department of Fish and Game.

APPENDIX A: THE PLANTS OF FISHERMAN'S CAMP

Candidate Research Natural Area
Mary Theresa Burke and Andy Sanders, 1991

FERNS AND ALLIES

ASPIDIACEAE

Polystichum munitum (Kaulf.)Presl.

PTERIDACEAE

Pteridium aquilinum (L.) Kuhn var. *pubescens* Underw.

CONIFEROUS PLANTS

CUPRESSACEAE

Calocedrus decurrens (Torr.)Florin

PINACEAE

Abies concolor (Gord. & Glend.)Lindl.
Pinus coulteri D.Don
Pinus jeffreyi Grev. & Balf. in A.Murr.
Pinus lambertiana Dougl.
Pinus ponderosa Laws.

DICOTYLEDONS

APIACEAE

Sanicula graveolens Poepp. ex DC.
Tauschia parishii (Coult. & Rose)Macbr.

ASTERACEAE

Agoseris heterophylla (Nutt.)Greene
Agoseris retrorsa (Benth.)Greene
Artemisia douglasiana Bess. in Hook
Artemisia dracunculus L.
Artemisia ludoviciana Nutt.
Chaenactis santolinoides Greene
Chrysanthemum cf. *parthenium* (L.)Bernh.
Corethrogyne filaginifolia (H. &. A.)Nutt.
Erigeron foliosus Nutt.
Eriophyllum confertiflorum (DC.)Gray
Eriophyllum lanatum (Pursh.)Forbes var. *obovatum* (Greene)Hall
Gnaphalium cf. *beneolens* Davids.
Solidago californica Nutt.

BETULACEAE

Alnus rhombifolia Nutt.

BORAGINACEAE

Cryptantha sp.

BRASSICACEAE

Arabis pulchra Jones
Barbarea orthoceras Ledeb.
Erysimum capitatum (Dougl.)Greene
Lepidium virginicum L. var. *pubescens* (Greene)There.
Streptanthus bernardinus (Greene)Parish

CARYOPHYLLACEAE

Silene cf. *verecunda* Wats. spp. *andersonii* (Clokey)Hitch. & Maquire

CHENOPODIACEAE

Chenopodium fremontii Wats.

CONVOLVULACEAE

Calystegia fulcrata (Gray)Brummitt

CORNACEAE

Cornus nuttallii Aud.
Cornus stolonifera Michx.

DATISCACEAE

Datisca glomerata (Presl.)Baill.

ERICACEAE

Arctostaphylos patula Greene X *glandulosa* Eastw. ?
Arctostaphylos pringlei Parry var. *drupacea* Parry

EUPHORBIACEAE

Euphorbia palmeri Engelm.

FABACEAE

Lathyrus laetiflorus Greene ssp. *laetiflorus*
Lotus crassifolius (Benth.)Greene
Lotus nevadensis Greene
Lupinus andersonii Wats.
Lupinus excubitus Jones

FAGACEAE

Quercus chrysolepis Liebm.
Quercus kelloggii Newb.

GERANIACEAE

Erodium sp.

HYDROPHYLLACEAE

Phacelia curvipes Torr. ex. Wats.
Phacelia imbricata Green

LAMIACEAE

Stachys sp.

LOASACEAE

Mentzelia cf. *pinetorum* Heller

ONAGRACEAE

Clarkia rhomboidea Dougl.
Epilobium cf. *adenocaulon* Hausskn.
Gayophytum sp.
Zauschneria californica Presl.

POLEMONIACEAE

Allophyllum integrifolium (Brand)A.& V. Grant
Eriastrum densifolium (Benth.)Mason spp. *austromontanum* (Craig)Mason
Gilia splendens Dougl. ex Lindl.
Linanthus breviculus (Gray)Greene

POLYGONACEAE

Eriogonum saxatile Wats.
Eriogonum umbellatum Torr.
Rumex cf. *crispus* L.

PORTULACACEAE

Claytonia perfoliata Donn. var. *perfoliata*

PYROLACEAE

Pyrola picta Sm.

RANUNCULACEAE

Aquilegia formosa Fisch. in DC.
Clematis ligusticifolia Nutt. in T.& G.

RHAMNACEAE

Rhamnus californica Esch.

ROSACEAE

Ceanothus integerrimus H. & A.
Geum macrophyllum Willd.
Ivesia santolinoides Gray
Malus sylvestris Mill. ?
Rosa woodsii Lindl.
Rubus parviflorus Nutt.

RUBIACEAE

Galium angustifolium Nutt.

SALICACEAE

Salix lasiolepis Benth.
Salix scouleriana Barr.

SAXIFRAGACEAE

Ribes nevadense Kell.

SCROPHULARIACEAE

Castilleja martinii Abrams var. *martinii*
Castilleja cf. *montigena* Heckard
Collinsia childii Parry ex Gray
Cordylanthus rigidus (Benth.)Jeps.?
Keckiella ternata (Torr. ex Gray)Straw.
Mimulus cardinalis Dougl. ex Benth.
Penstemon bridgesii Gray
Penstemon grinnellii Eastw. ssp. *grinnellii* (Jones)Munz

URTICACEAE

Urtica holosericea Nutt.

VISCACEAE

Phorodendron villosum (Nutt. in T.&G.)Nutt.

MONOCOTYLEDONS

AMARYLLIDACEAE

Allium sp.
Muilla maritima (Torr.)Wats.

CYPERACEAE

Carex sp.
Carex multicaulis Bailey

IRIDACEAE

Iris hartwegii Baker ssp. *australis* (Parish)Lenz.

JUNCACEAE

Juncus cf. *effusus* L.
Juncus cf. *macrophyllus* Cov.

LILIACEAE

Lilium cf. *humboldtii* Roezl. & Leichtl.

ORCHIDACEAE

Corralorhiza maculata Raf.

POACEAE

Agropyron cf. *intermedium*
Agropyron parishii Scribn. & Sm
Bromus cf. *grandis* (Shear)Hitchc.
Bromus cf. *richardsonii* Link
Bromus carinatus Hook & Arn.
Bromus ciliatus L.
Bromus diandrus Roth.
Bromus marginatus Nees.
Bromus tectorum L.
Festuca arundinacea Schreb.
Festusa microstachys Nutt.
Poa fendleriana (Steud.)Vasey
Stipa sp.
Stipa latiglumis Swall.

APPENDIX B: CHECKLIST OF PLANTS OF FISHERMAN'S CAMP

Candidate Research Natural Area
Mary Burke and Andy Sanders
1991

All page numbers refer to Munz' "A Flora of Southern California", except where preceded by an "M...". These numbers refer to Munz and Keck's "A California Flora".

Family	PgNo	Plant Name	Plant Notes
PIN	38	Abies concolor	erect solitary needles
AST	108	Agoseris heterophylla	
AST	108	Agoseris retrorsa	
POA	940	Agropyron cf. intermedium	along Deep Creek
POA	940	Agropyron parishii	
AMA	874	Allium sp.	
POL	640	Allophyllum integrifolium	coll. AS
BET	245	Alnus rhombifolia	mostly along Deep Creek
RAN	721	Aquilegia formosa	along Deep Creek
BRA	273	Arabis pulchra Jones	Purple flowers, lvs 4-8 cm long. Fairly common.
ERI	400	Arctostaphylos patula X glandulosa ?	coll. AS
ERI	401	Arctostaphylos pringlei var. drupacea	gray-grn lvs, hairy; bracts shorter than infl.
AST	117	Artemisia douglasiana	along Deep Creek
AST	117	Artemisia dracunculus	Common perennial herb to 2 ft.; along Deep Creek
AST	117	Artemisia ludoviciana	Peren. herb, whitish lobed lvs., along Deep Creek
BRA	276	Barbarea orthoceras	Broad lobed lvs, prostrate in rosettes, wet soil.
POA	953	Bromus cf. grandis	
POA	956	Bromus cf. richardsonii	
POA	952	Bromus carinatus	
POA	952	Bromus ciliatus	canescent leaves
POA	953	Bromus diandrus	
POA	955	Bromus marginatus	
POA	956	Bromus tectorum	drooping reddish inflor.
CUP	36	Calocedrus decurrens	
CON	373	Calystegia fulcrata	
CYP	885	Carex sp.	
CYP	892	Carex multicaulis	
SCR	796	Castilleja martinii var. martinii	
SCR	-	Castilleja montigena ?	CNPS List 4. [Castilleja martinii ewanii]
ROS	737	Ceanothus integerrimus	
AST	138	Chaenactis santolinoides	coll. AS
CHE	361	Chenopodium fremontii	
AST	140	Chrysanthemum cf. parthenium	solitary, along Deep Creek
ONA	603	Clarkia rhomboidea	
POR	712	Claytonia perfoliata var. perfoliata	
RAN	722	Clematis ligusticifolia	
SCR	799	Collinsia childii	coll. AS
SCR	802	Cordylanthus rigidus ?	
AST	151	Corethrogyne filaginifolia	
COR	381	Cornus nuttallii	
COR	381	Cornus stolonifera	along Deep Creek
ORC	932	Corralorhiza maculata	
BOR	251	Cryptantha sp.	coll. AS
DAT	393	Datisca glomerata	
ONA	605	Epilobium cf. adenocaulon	
POL	642	Eriastrum densifolium spp. austromontanum	
AST	161	Erigeron foliosus	
POL	695	Eriogonum saxatile	
POL	696	Eriogonum umbellatum	
AST	163	Eriophyllum confertiflorum	Yellow yarrow-like flowers; toothed 3-lobed lvs
AST	164	Eriophyllum lanatum var. obovatum	
GER	490	Erodium sp.	
BRA	290	Erysimum capitatum	Spreading siliques.
EUP	413	Euphorbia palmeri	Flat lvs, milky juice.
POA	972	Festuca arundinacea	along Deep Creek
POA	972	Festusa microstachys	
RUB	764	Galium angustifolium	
ONA	608	Gayophytum sp.	
ROS	746	Geum macrophyllum	
POL	653	Gilia splendens	coll. AS
AST	170	Gnaphalium cf. beneolens	Along Deep Creek

IRI	907	Iris hartwegii ssp. australis	
ROS	750	Ivesia santolinoides	
JUN	911	Juncus cf. effusus	Along Deep Creek
JUN	912	Juncus cf. macrophyllus	Along Deep Creek
SCR	804	Keckiella ternata	
FAB	443	Lathyrus laetiflorus ssp. laetiflorus	
BRA	295	Lepidium virginicum var. pubescens	along Deep Creek
LIL	928	Lilium cf. humboldtii	along Deep Creek
POL	660	Linanthus breviculus	
FAB	446	Lotus crassifolius	
FAB	447	Lotus nevadensis	Dry slopes, prostrate. coll AS/FC
FAB	454	Lupinus andersonii	coll. AS
FAB	457	Lupinus excubitus	
ROS	M792	Malus sylvestris ?	along Deep Creek, young plants
LOA	557	Mentzelia cf. pinetorum	coll. AS
SCR	810	Mimulus cardinalis	
AMA	881	Muilla maritima	
SCR	820	Penstemon bridgesii Gray	brilliant red flw, upper lip extended, lower reflexed
SCR	822	Penstemon grinnellii ssp. grinnellii	inflated sky blue flws
HYD	508	Phacelia curvipes	
HYD	511	Phacelia imbricata	coll. AS
VIS	858	Phorodendron villosum	coll. AS
PIN	39	Pinus coulteri	
PIN	39	Pinus jeffreyi	
PIN	39	Pinus lambertiana	
PIN	40	Pinus ponderosa	
POA	994	Poa fendleriana	coll. AS
FER	19	Polystichum munitum	
FER	32	Pteridium aquilinum	common, about 2 ft. high
PYR	403	Pyrola picta	
FAG	480	Quercus chrysolepis	
FAG	481	Quercus kelloggii	Lobed lvs.
RHA	738	Rhamnus californica	Along Deep Creek.
SAX	788	Ribes nevadense	no spines, wet places, highly deciduous lg. lvs. along Deep Creek
ROS	759	Rosa woodsii	spines straight, slender, not curved; along Deep Creek
ROS	760	Rubus parviflorus	
POL	706	Rumex cf. crispus	along Deep Creek
SAL	775	Salix lasiolepis	
SAL	776	Salix scouleriana	
API	85	Sanicula graveolens	coll. AS
CAR	344	Silene cf. verecunda spp. andersonii	coll. AS
AST	228	Solidago californica	Perennial herb, broad lvs.
LAM	541	Stachys sp.	along Deep Creek
POA	1002	Stipa sp.	
POA	1004	Stipa latiglumis	coll. AS
BRA	303	Streptanthus bernardinus	coll. AS; CNPS List 1B
API	86	Tauschia parishii	
URT	847	Urtica holosericea Nutt.	along Deep Creek
ONA	616	Zauschneria californica Presl.	

APPENDIX C: PREDICTED WILDLIFE OF FISHERMAN'S CAMP CANDIDATE RNA
California Department of Fish and Game Wildlife Habitat Relationship System (Timossi, 1989)

Steve Loe, Forest Wildlife Biologist, USFS San Bernardino National Forest

Status Definitions:
- FE: Federally Endangered
- FT: Federally Threatened
- CE: California Endangered
- CT: California Threatened
- CP: California Protected
- FS: Forest Service Sensitive
- BS: BLM Sensitive
- H : Harvest Species
- CalSP: California Species of Special Concern

ID#	Common Name	Scientific Name	Family	Status
AMPHIBIANS				
A007	California Newt	Taricha torosa	Salamandridae	
A012	Ensatina	Ensatina eschscholtzi	Plethodontidae	
A032	Western Toad	Bufo boreas	Bufonidae	
A039	Pacific Treefrog	Hlya regilla	Hylidae	
A046	Bullfrog	Rana catesbeiana	Ranidae	H
BIRDS				
B051	Great Blue Heron	Ardea herodias	Ardidae	
B103	Bufflehead	Bucephala albeola	Anatidae	H
B113	Bald Eagle	Haliaeetus leucocephalus	Accipitridae	FE; CE; CP
B115	Sharp-Shinned Hawk	Accipiter striatus	Accipitridae	CalSP
B116	Cooper's Hawk	Accipiter cooperii	Accipitridae	CalSP
B117	Northern Goshawk	Accipiter gentilis	Accipitridae	FS; CalSP
B123	Red-Tailed Hawk	Buteo jamaicensis	Accipitridae	
B126	Golden Eagle	Aquila chrysaetos	Accipitridae	CP; FS; CalSP
B127	American Kestrel	Falco sparverius	Falconidae	
B128	Merlin	Falco columbarius	Falconidae	CalSP
B131	Prairie Falcon	Falco mexicanus	Falconidae	FS
B140	California Quail	Callipepla californica	Phasianidae	H
B141	Mountain Quail	Oreortyx pictus	Phasianidae	H
B251	Band-Tailed Pigeon	Columba fasciata	Columbiadae	H
B255	Mourning Dove	Zenaida macroura	Columbidae	H
B262	Common Barn Owl	Tyto alba	Tytonidae	
B263	Flammulated Owl	Otus flammeolus	Strigidae	
B264	Western Screech Owl	Otus kennicottii	Strigidae	
B265	Great Horned Owl	Bubo virginianus	Strigidae	
B267	Northern Pygmy Owl	Glaucidium gnoma	Strigidae	
B270	Spotted Owl	Strix occidentalis	Strigidae	FS; CalSP
B272	Long-Eared Owl	Asio otus	Strigidae	CalSP
B274	Northern Saw-Whet Owl	Aegolius acadicus	Strigidae	
B276	Common Nighthawk	Cordeiles minor	Caprimulgidae	
B277	Common Poorwill	Phalaenoptilus nuttallii	Caprimulgidae	
B278	Whip-Poor-Will	Caprimulgus vociferus	Caprimulgidae	
B279	Black Swift	Cypseloides niger	Apodidae	CalSP
B287	Anna's Hummingbird	Calypte anna	Trochilidae	
B289	Calliope Hummmingbird	Stellula calliope	Trochilidae	
B294	Lewis' Woodpecker	Melanerpes lewis	Picidae	
B296	Acorn Woodpecker	Melanerpes formicivorus	Picidae	
B298	Red-Naped Sapsucker	Sphyrapicus nuchalis	Picidae	
B299	Red-Breasted Sapsucker	Sphyrapicus ruber	Picidae	
B300	Williamson's Sapsucker	Sphyrapicus thyroideus	Picidae	
B303	Downy Woodpecker	Picoides pubescens	Picidae	
B304	Hairy Woodpecker	Picoides villosus	Picidae	
B307	Northern Flicker	Colaptes auratus	Picidae	
B309	Olive-sided Flycatcher	Contopus borealis	Tyrannidae	
B311	Western Wood-Pewee	Contopus sordidulus	Tyrannidae	
B318	Dusky Flycatcher	Empidonax oberholseri	Tyrannidae	
B338	Purple Martin	Progne subis	Hirundinidae	CalSP
B340	Violet-Green Swallow	Tachycineta thalassina	Hirundinidae	
B346	Steller's Jay	Cyanocitta stelleri	Corvidae	
B349	Pinyon Jay	Gymnorhinus cyanocephalus	Corvidae	
B350	Clark's Nutcracker	Nucifraga columbiana	Corvidae	
B353	American Crow	Corvus brachyrhynchos	Corvidae	H
B354	Common Raven	Corvuus corax	Corvidae	

B356	Mountain Chickadee	Parus gambeli	Paridae	
B361	Red-Breasted Nuthatch	Sitta canadensis	Sittidae	
B362	White-Breasted Nuthatch	Sitta carolinesis	Sittidae	
B363	Pygmy Nuthatch	Sitta pygmaea	Sittidae	
B364	Brown Creeper	Certhia americana	Certhiidae	
B368	Bewick's Wren	Thryomanes bewickii	Troglodytidae	
B375	Golden-Crowned Kinglet	Regulus satrapa	Muscicapidae	
B376	Ruby-Crowned Kinglet	Regulus calendula	Muscicapidae	
B380	Western Bluebird	Sialia mexicana	Muscicapidae	
B381	Mountain Bluebird	Sialia currucoides	Muscicapidae	
B382	Townsend's Solitaire	Myadestes townsendi	Muscicapidae	
B385	Swainson's Thrush	Catharus ustulatus	Muscicapidae	
B386	Hermit Thrush	Catharus guttatus	Muscicapidae	
B389	American Robin	Turdus migratorius	Muscicapidae	
B390	Varied Thrush	Ixoreus naevius	Muscicapidae	
B391	Wrentit	Chamaea fasciata	Muscicapidae	
B407	Cedar Waxwing	Bombycilla cedrorum	Bombycillidae	
B411	European Starling	Sturnus vulgaris	Sturnidae	
B415	Solitary Vireo	Vireo solitarius	Vireonidae	
B418	Warbling Vireo	Vireo gilvus	Vireonidae	
B425	Orange-Crowned Warbler	Vermivora celata	Emberizidae	
B426	Nashville Warbler	Vermivora ruficapilla	Emberizidae	
B430	Yellow Warbler	Dendroica petechia	Emberizidae	CalSP
B435	Yellow-Rumped Warbler	Dendroica coronata	Emberizidae	
B436	Black-Throated Gray Warbler	Dendroica nigrescens	Emberizidae	
B437	Townsend's Warbler	Dendroica townsendi	Emberizidae	
B438	Hermit Warbler	Dendroica occidentalis	Emberizidae	
B463	Wilson's Warbler	Wilsonia pusilla	Emberizidae	
B471	Western Tanager	Piranga ludoviciana	Emberizidae	
B475	Black-Headed Grosbeak	Pheucticus melanocephalus	Emberizidae	
B477	Lazuli Bunting	Passerina amoena	Emberizidae	
B482	Green-Tailed Towhee	Pipilo chlorurus	Emberizidae	
B483	Rufous-Sided Towhee	Pipilo erythrophthalmus	Emberizidae	
B489	Chipping Sparrow	Spizella passerina	Emberizidae	
B504	Fox Sparrow	Passerella iliaca	Emberizidae	CalSP
B506	Lincoln's Sparrow	Melospiza lincolnii	Emberizidae	
B509	Golden-Crowned Sparrow	Zonotrichia atricapilla	Emberizidae	
B510	White-Crowned Sparrow	Zonotrichia leucophrys	Emberizidae	
B512	Dark-Eyed Junco	Junco hyemalis	Emberizidae	
B521	Western Meadowlark	Sturnella neglecta	Emberizidae	
B528	Brown-Headed Cowbird	Molothrus ater	Emberizidae	
B532	Northern Oriole	Icterus galbula	Emberizidae	
B536	Purple Finch	Carpodacus purpureus	Fringillidae	
B537	Cassin's Finch	Carpodacus cassinii	Fringillidae	
B539	Red Crossbill	Loxia curvirostra	Fringillidae	
B542	Pine Siskin	Carduelis pinus	Fringillidae	
B543	Lesser Goldfinch	Carduelis psaltria	Fringillidae	
B544	Lawrence's Goldfinch	Carduelis lawrencei	Fringillidae	
B546	Evening Grosbeak	Coccothraustes vespertinus	Fringillidae	CalSP

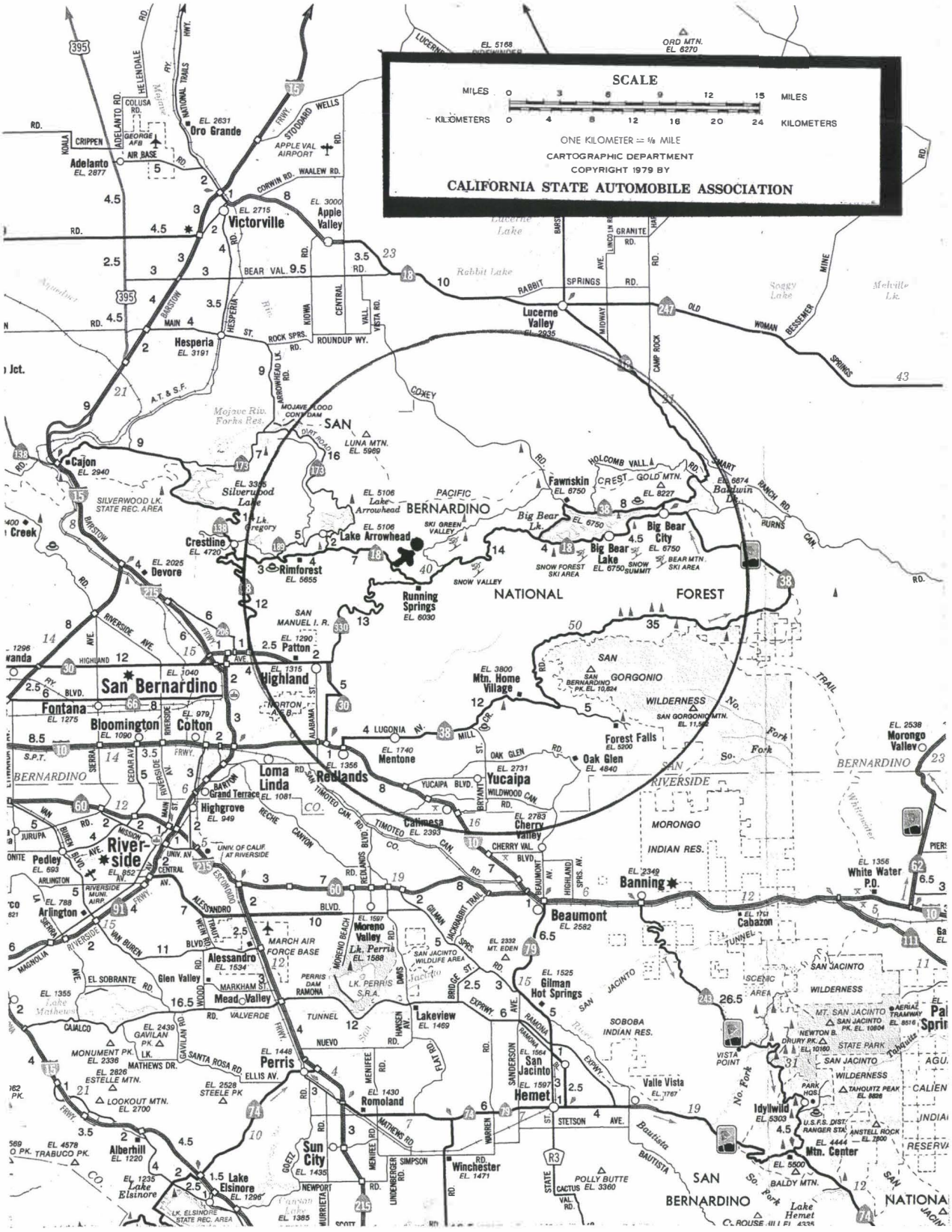
MAMMALS

M004	Dusky Shrew	Sorex monticolus	Soricidae	
M006	Ornate Shrew	Sorex ornatus	Soricidae	
M018	Broad-footed Mole	Scapanus latimanus	Talpidae	
M021	Little Brown Myotis	Myotis lucifugus	Vespertilionidae	
M023	Yuma Myotis	Myotis yumanensis	Vespertilionidae	
M025	Long-Eared Myotis	Myotis evotis	Vespertilionidae	
M026	Fringed Myotis	Myotis thysanoides	Vespertilionidae	
M027	Long-Legged Myotis	Myotis volans	Vespertilionidae	
M028	California Myotis	Myotis californica	Vespertilionidae	
M029	Small-Footed Myotis	Myotis leibii	Vespertilionidae	
M031	Western Pipistrelle	Pipistrellus hesperus	Vespertilionidae	
M032	Big Brown Bat	Eptesicus fuscus	Vespertilionidae	
M033	Red Bat	Lasiurus borealis	Vespertilionidae	
M034	Hoary Bat	Lasiurus cinereus	Vespertilionidae	
M036	Spotted Bat	Euderma maculatum	Vespertilionidae	CalSP
M037	Townsend's Big-Eared Bat	Plecotus townsendii	Vespertilionidae	CalSP
M038	Pallid Bat	Antrozous pallidus	Vespertilionidae	CalSP
M039	Brazilian Free-Tailed Bat	Tadarida brasiliensis	Molossidae	
M045	Brush Rabbit	Sylvilagus bachmani	Leporidae	H; CalSP
M060	Merriam's Chickmunk	Eutamias merriami	Sciuridae	
M061	California Chipmunk	Eutamias obscurus	Sciuridae	
M072	California Ground Squirrel	Spermophilus beecheyi	Sciuridae	
M077	Western Gray Squirrel	Sciurus griseus	Sciuridae	H
M080	Northern Flying Squirrel	Glaucomys sabrinus	Sciuridae	CalSP

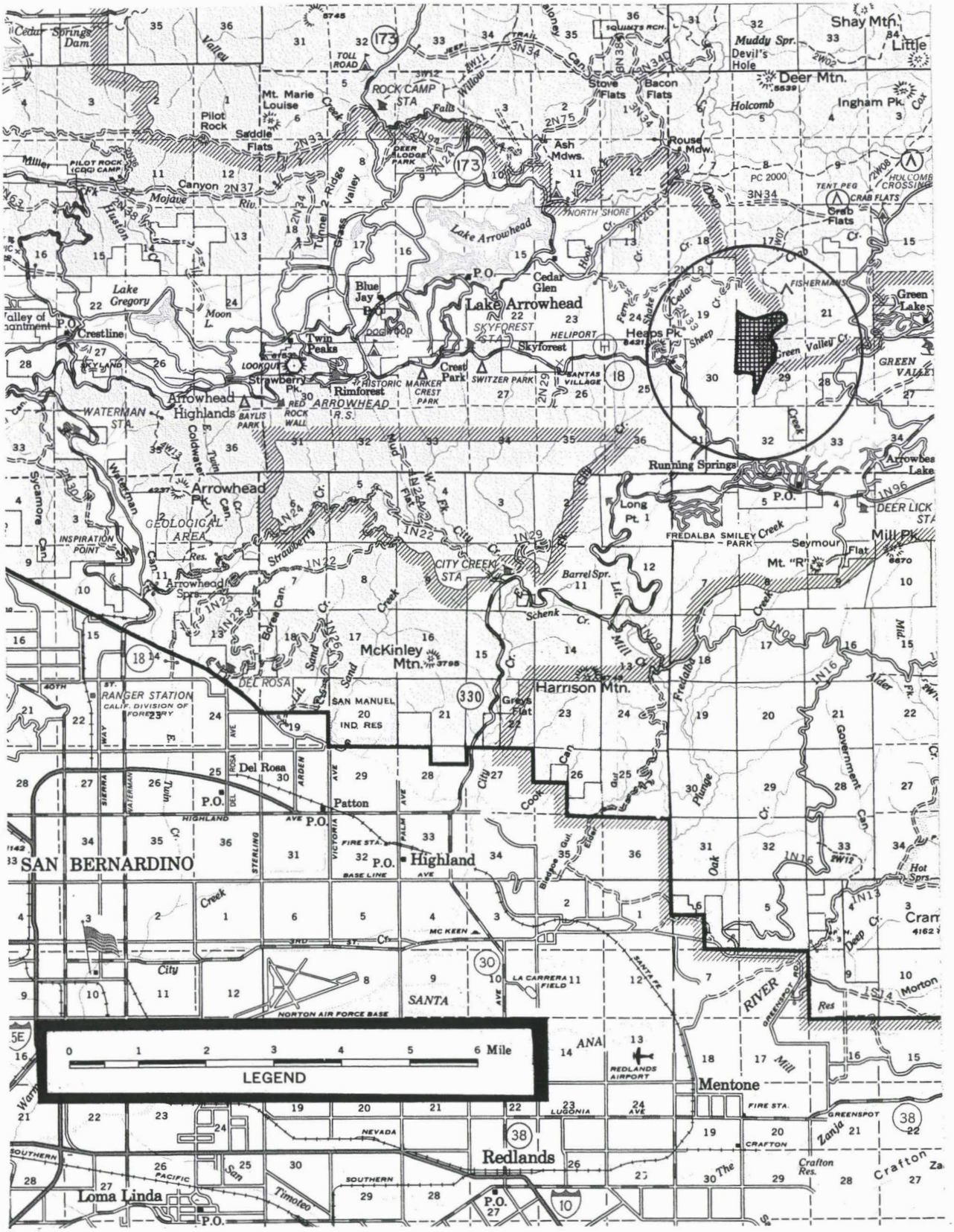
M081	Botta's Pocket Gopher	Thomomys bottae	Geomyidae	
M103	Pacific Kangaroo Rat	Dipodomys agilis	Heteromyidae	
M112	Beaver	Castor canadensis	Castoridae	
M113	Western Harvest Mouse	Reithrodontomys megalotis	Cricetidae	CalSP
M116	California Mouse	Peromyscus californicus	Cricetidae	
M117	Deer Mouse	Peromyscus maniculatus	Cricetidae	CalSP
M119	Brush Mouse	Peromyscus boylii	Cricetidae	
M120	Pinyon Mouse	Peromyscus truei	Cricetidae	
M127	Dusky-Footed Woodrat	Neotoma fuscipes	Cricetidae	CalSP
M134	California Vole	Microtus californicus	Cricetidae	CalSP
M136	Long-Tailed Vole	Microtus longicaudus	Cricetidae	
M142	House Mouse	Mus musculus	Muridae	
M145	Porcupine	Erethizon dorsatum	Erethizontidae	
M146	Coyote	Canis latrans	Canidae	H
M149	Gray Fox	Urocyon cinereoargenteus	Canidae	H
M151	Black Bear	Ursus americanus	Ursidae	H
M152	Ringtail	Bassariscus astutus	Procyonidae	CP
M153	Raccoon	Procyon lotor	Procyonidae	H
M157	Long-Tailed Weasel	Mustela frenata	Mustelidae	H
M160	Badger	Taxidea taxus	Mustelidae	H; CalSP
M162	Striped Skunk	Mephitis mephitis	Mustelidae	H
M165	Mountain Lion	Felis concolor	Felidae	H; CalSP
M181	Mule Deer	Odocoileus hemionus	Cervidae	H

REPTILES

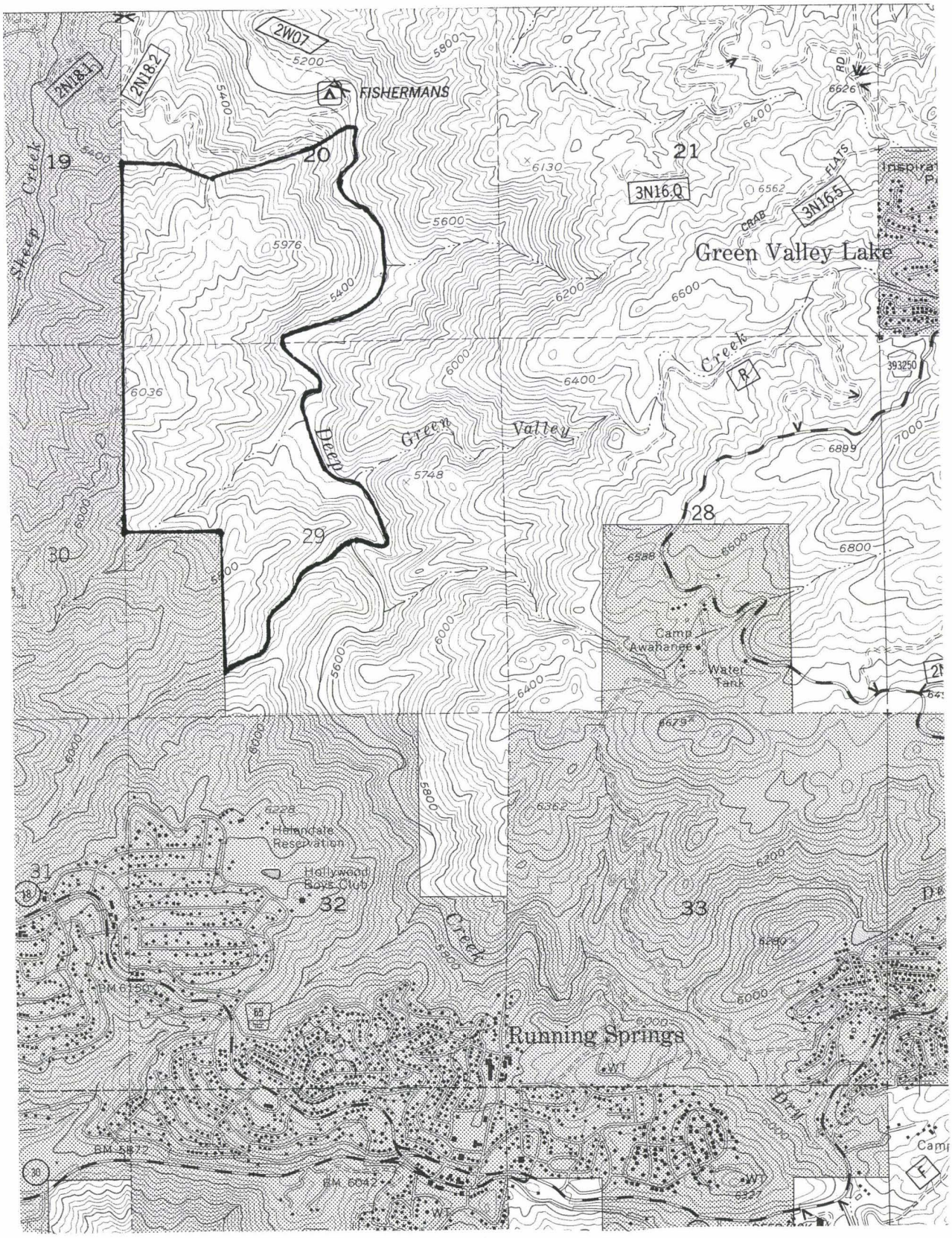
R022	Western Fence Lizard	Sceloporus occidentalis	Iguanidae
R023	Sagebrush Lizard	Sceloporus graciosus	Iguanidae
R036	Western Skink	Eumeces skiltonianus	Scincidae
R039	Western Whiptail	Cnemidophorus tigris	Teiidae
R040	Southern Alligator Lizard	Gerrhonotus multicarinatus	Anguidae
R046	Rubber Boa	Charina bottae	Boidae
R048	Ringtail Snake	Diadophis punctatus	Colubridae
R051	Racer	Coluber constrictor	Colubridae
R053	California Whipsnake	Masticophis lateralis	Colubridae
R057	Gopher Snake	Pituophis melanoleucus	Colubridae
R058	Common Kingsnake	Lampropeltis getulus	Colubridae
R059	California Mountain Kingsnake	Lampropeltis zonata	Colubridae
R061	Common Garter Snake	Thamnophis sirtalis	Colubridae
R062	Western Terrestrial Garter Snake	Thamnophis elegans	Colubridae
R063	Western Aquatic Garter Snake	Thamnophis couchi	Colubridae
R071	Night Snake	Hypsiglena torquata	Colubridae
R074	Speckled Rattlesnake	Crotalus mitchelli	Viperidae
R076	Western Rattlesnake	Crotalus viridis	Viperidae



MAP 1. VICINITY MAP.
Fisherman's Camp Candidate Research Natural Area.
Big Bear District. San Bernardino National Forest.



MAP 2. US FOREST SERVICE VICINITY MAP.
San Bernardino National Forest Map. San Bernardino Mountain Area. San Bernardino Meridian. 1981.

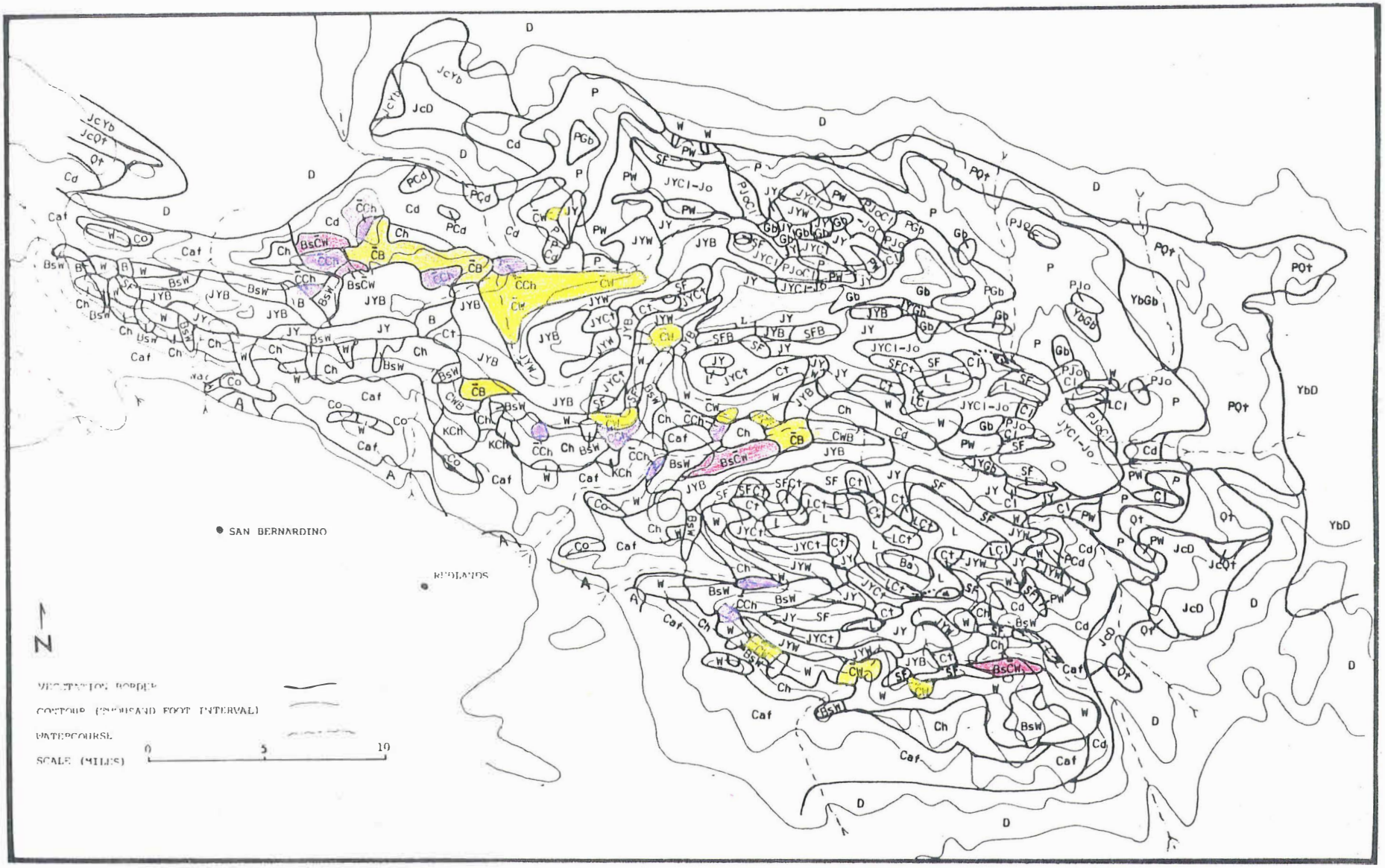


MAP 3. KELLER PEAK, CALIF. (1:24,000).
Fisherman's Camp Candidate Research Natural Area.
Arrowhead Ranger District. San Bernardino National Forest.

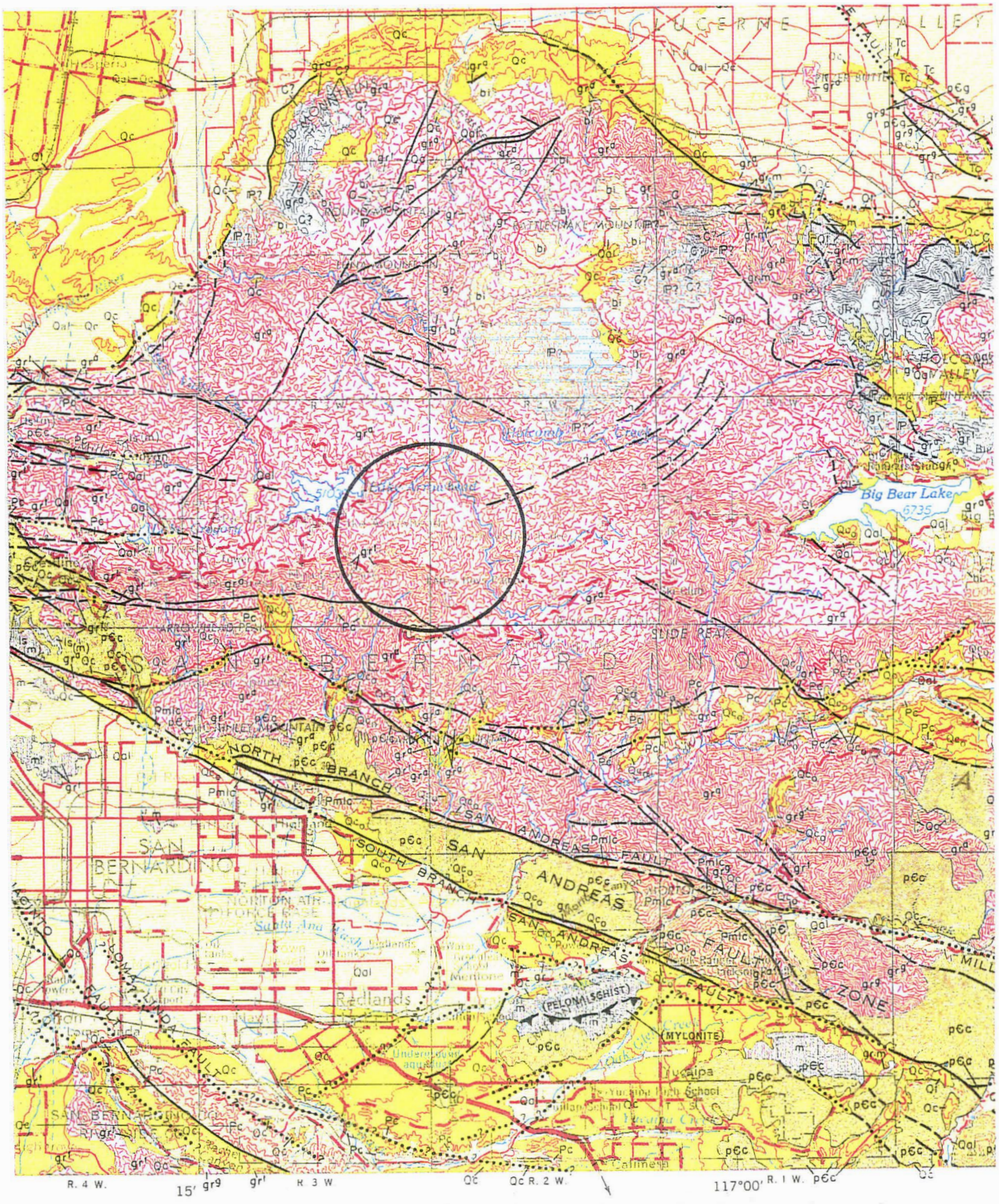
KEY FOR GENERAL VEGETATION MAP OF THE SAN BERNARDINO MOUNTAINS.
Taken in full from Minnick (1976).

I	A	CALIFORNIA SAGE SCRUB (Ac,Ef,Sa,Sm)
II	C	CHAPARRAL
	Caf	Chamise Chaparral (Af dominant over other chaparral shrubs)
	Ch	Mixed Chaparral (Ag,Agl,Ccr,Cd,Cb,Qd, Qw, together dominant over Af)
	Co	Oak Chaparral (Qd,Qw dominant over other chaparral shrubs)
	Cd	Desert Chaparral (Cg,Cb,Fc,Ag,Qw together dominant over Qt)
III		OAK WOODLAND
	Wa	Quercus agrifolia
	W	Quercus chrysolepis
IV		CONIFER FORESTS IN CHAPARRAL
	KCh	Pinus attenuata in Mixed Chaparral
	CCh	Pinus coulteri in Mixed Chaparral
	BsW	Pseudotsuga macrocarpa, Quercus chrysolepis
V		MARGINAL FORESTS
	CW	Pinus coulteri, Quercus chrysolepis
	CB	Pinus coulteri, Quercus kelloggii
	B	Quercus kelloggii
VI		WESTERN CONIFEROUS FOREST
	JY	Pinus jeffreyi, P. ponderosa dominant over P. lambertiana, Abies concolor
	JYW	with Quercus chrysolepis
	JYB	with Quercus kelloggii
	JYCt	with Timberland Chaparral
	JYCl-Jo	with Cercocarpus ledifolius,
or	JYCl	Juniperus occidentalis
	JYGb	with Great Basin Sage Scrub
	SF	Pinus lambertiana, Abies concolor dominant over P. jeffreyi, P. ponderosa
	SFB	with Quercus kelloggii
	SFCt	with Timberland Chaparral
	SFCl	with Cercocarpus ledifolius
VII	Ct	TIMBERLAND CHAPARRAL (Ap,Cco,Cs)
VIII		LODGEPOLE PINE FOREST
	L	Pinus murrayana, P. flexilis
	LCt	with Timberland Chaparral
	LCl	with Cercocarpus ledifolius
IX		PINYON WOODLAND
	P	Pinus monophylla
	PJoCl,	with Juniperus occidentalis, Cerco-
or	PJo	carpus ledifolius
	Cl	Cercocarpus ledifolius
	PW	with Quercus chrysolepis
	PGb	with Great Basin Sage Scrub
	PCd	with Desert Chaparral
	PQt	with Desert Oak Scrub
X	Gb	GREAT BASIN SAGE SCRUB (Atr,Chn,Pg)
XI	Qt	DESERT OAK SCRUB (Qt dominant over Cg,Cb,Fc,Qw)
XII		JUNIPER WOODLAND (Juniperus californica)
	JcQt	with Desert Oak Scrub
	JcYb	with Yucca brevifolia
	JcD	with Desert Vegetation
XIII		JOSHUA TREE WOODLAND (Yucca brevifolia)
	YbGb	with Great Basin Sage Scrub
	YbD	with Desert Vegetation
XIV	D	DESERT VEGETATION
XV	Ba	BARREN

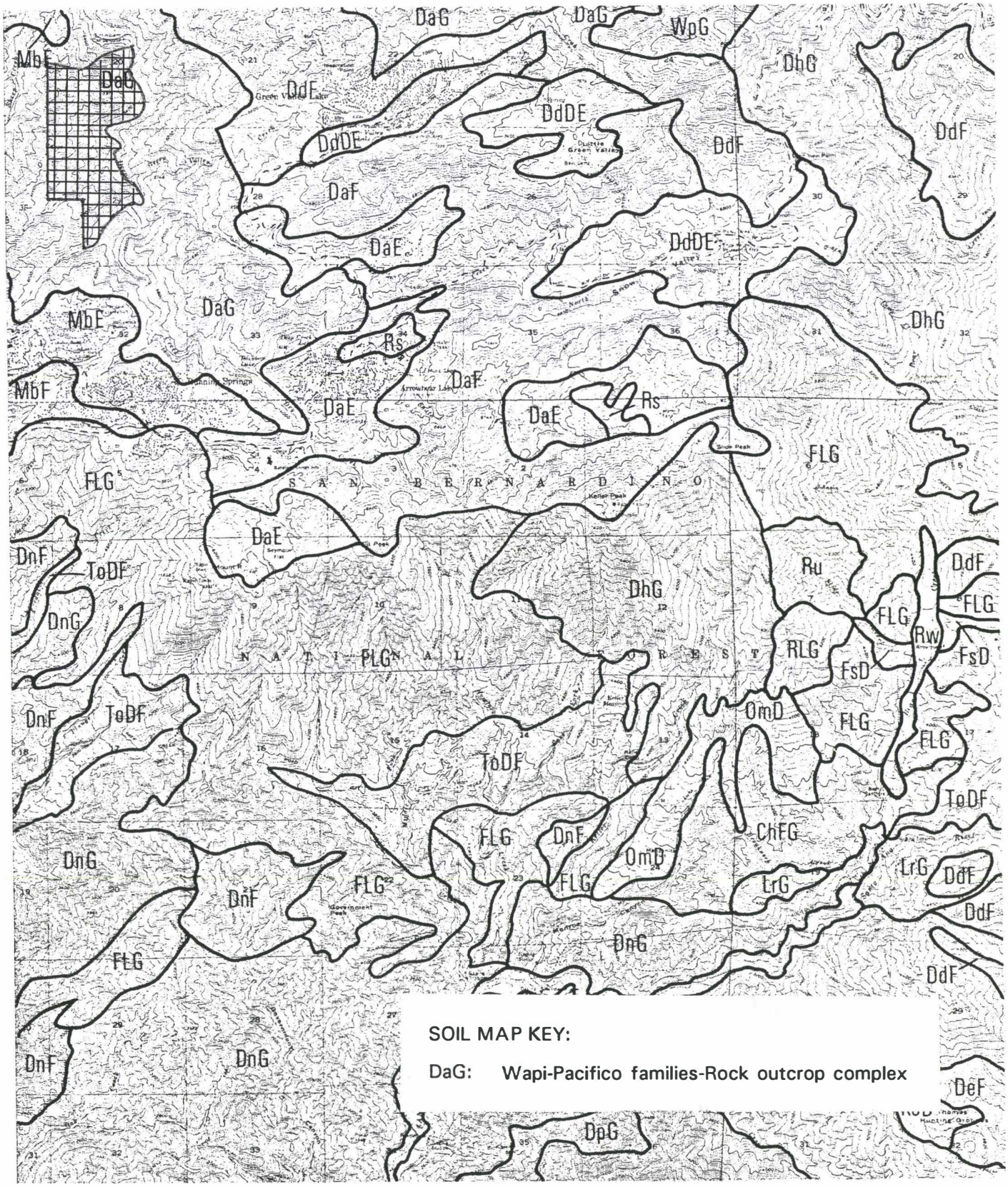
MAP 4. GENERAL VEGETATION MAP OF THE SAN BERNARDINO MOUNTAINS.
Taken in full from Minnick (1976).



MAP 5. COULTER PINE VEGETATION TYPES IN THE SAN BERNARDINO MOUNTAINS.
Taken in full from Minnick (1976), with color emphasis of vegetation types added by Burke.



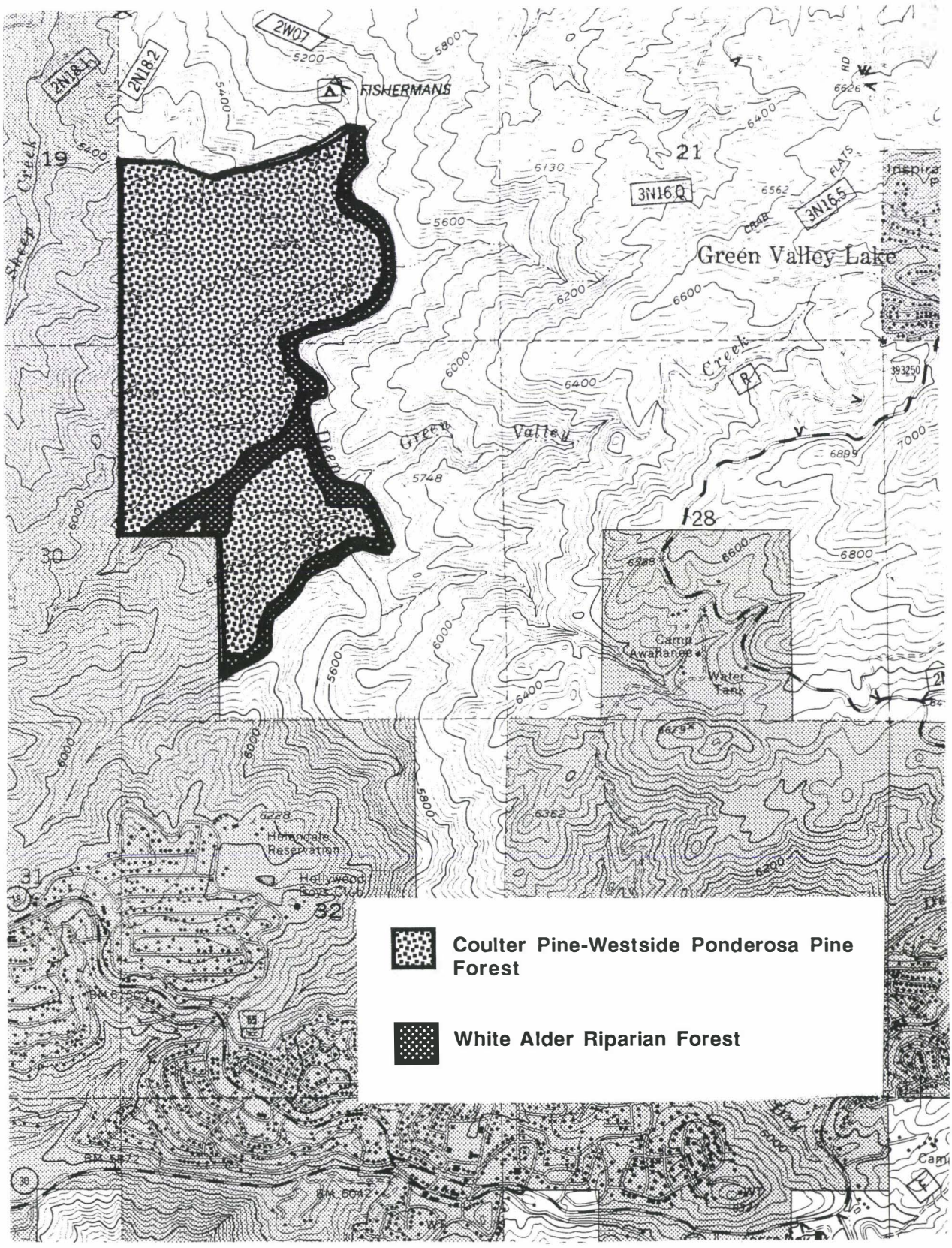
MAP 6. GEOLOGIC MAP: Fisherman's Camp candidate Research Natural Area. (from San Bernardino Quadrangle, Bortugno and Spittler 1986).



SOIL MAP KEY:

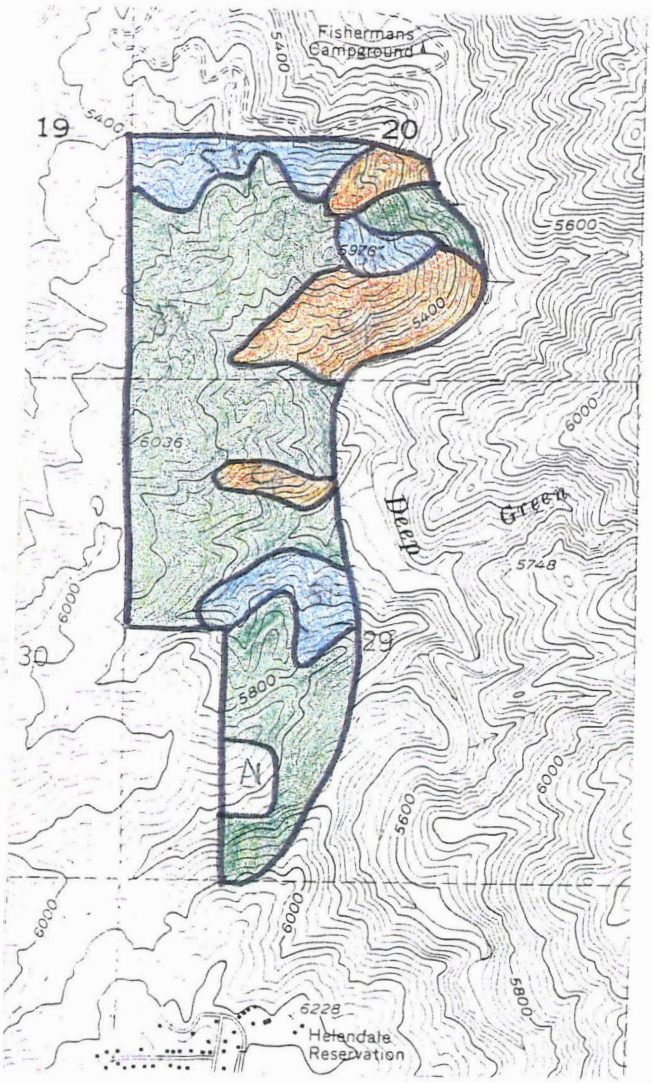
DaG: Wapi-Pacifico families-Rock outcrop complex

MAP 7. SOIL MAP: FISHERMAN'S CAMP CANDIDATE RESEARCH NATURAL AREA. (USDA-Forest Service 1980).

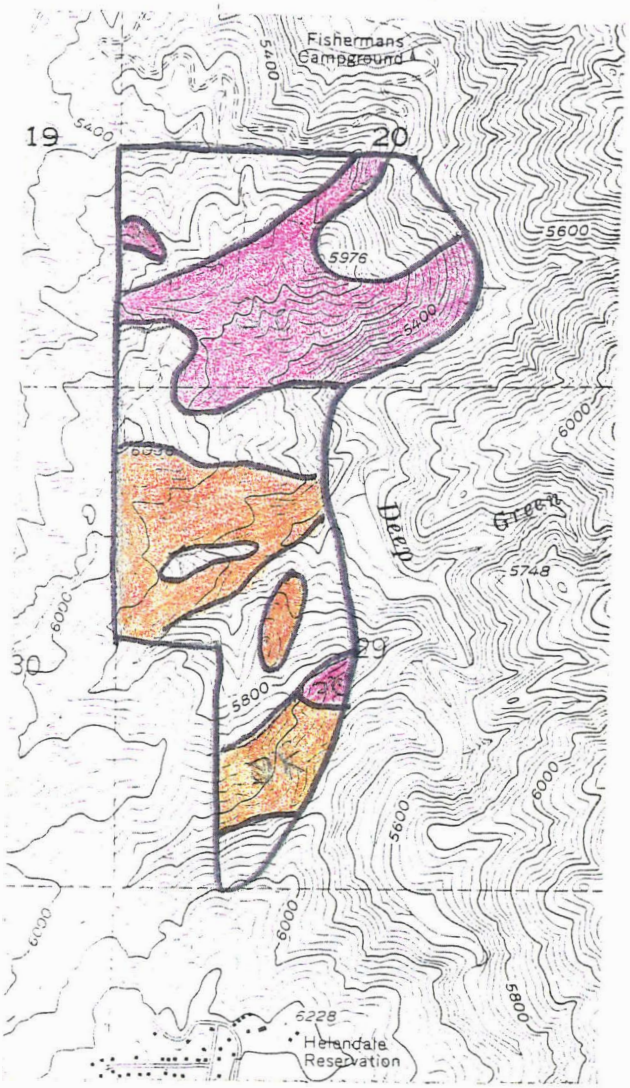


MAP 8. VEGETATION MAP: Fisherman's Camp candidate Research Natural Area.

CONIFEROUS TREE SPECIES



HARDWOOD TREE SPECIES



Mixed Conifer Forest:
Abies concolor, Pinus lambertiana

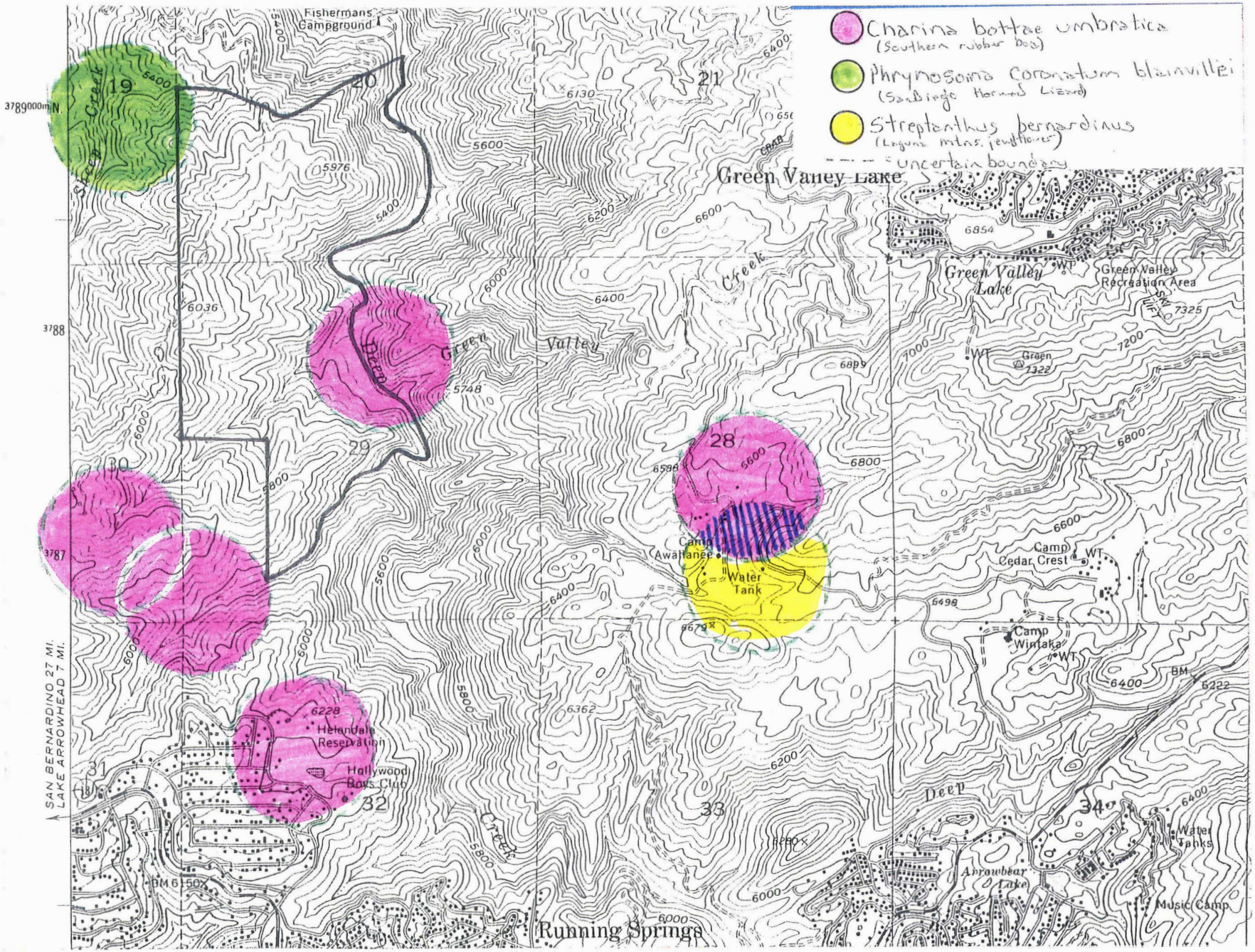
Mixed Conifer Forest:
Pinus ponderosa

Pinus coulteri

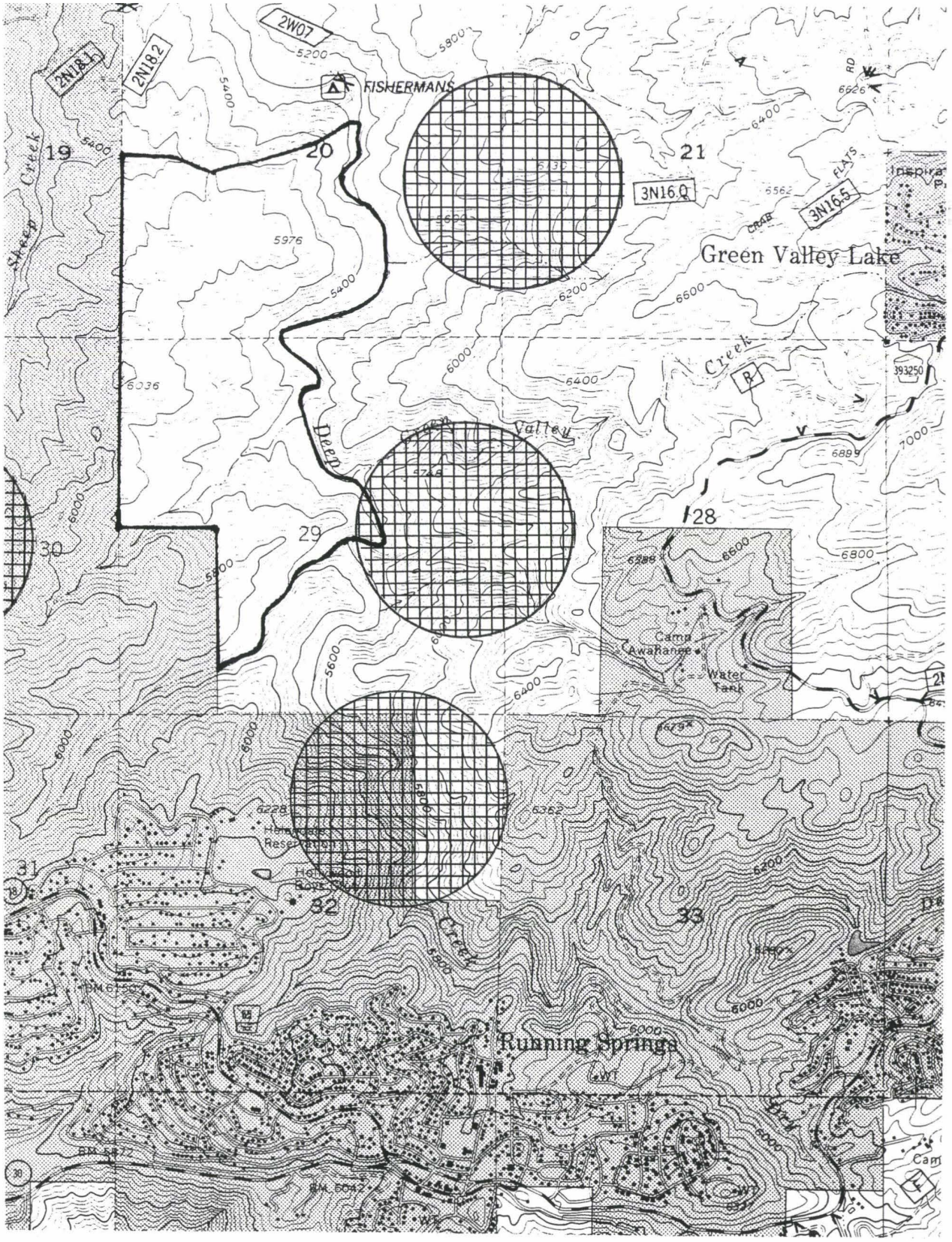
Quercus chrysolepis

Quercus kelloggii

MAP 9. Distribution of Forest Tree Species. Fisherman's Camp Candidate Research Natural Area. (Minnick 1991, unpublished, prepared for this report)



MAP 10. KNOWN POPULATIONS OF SPECIAL PLANTS AND ANIMALS IN THE FISHERMAN'S CAMP AREA.
(Nosal, Natural Diversity Data Base, Department of Fish and Game, California)



MAP 11. Spotted Owl Territory in the Fisherman's Camp candidate RNA Vicinity.

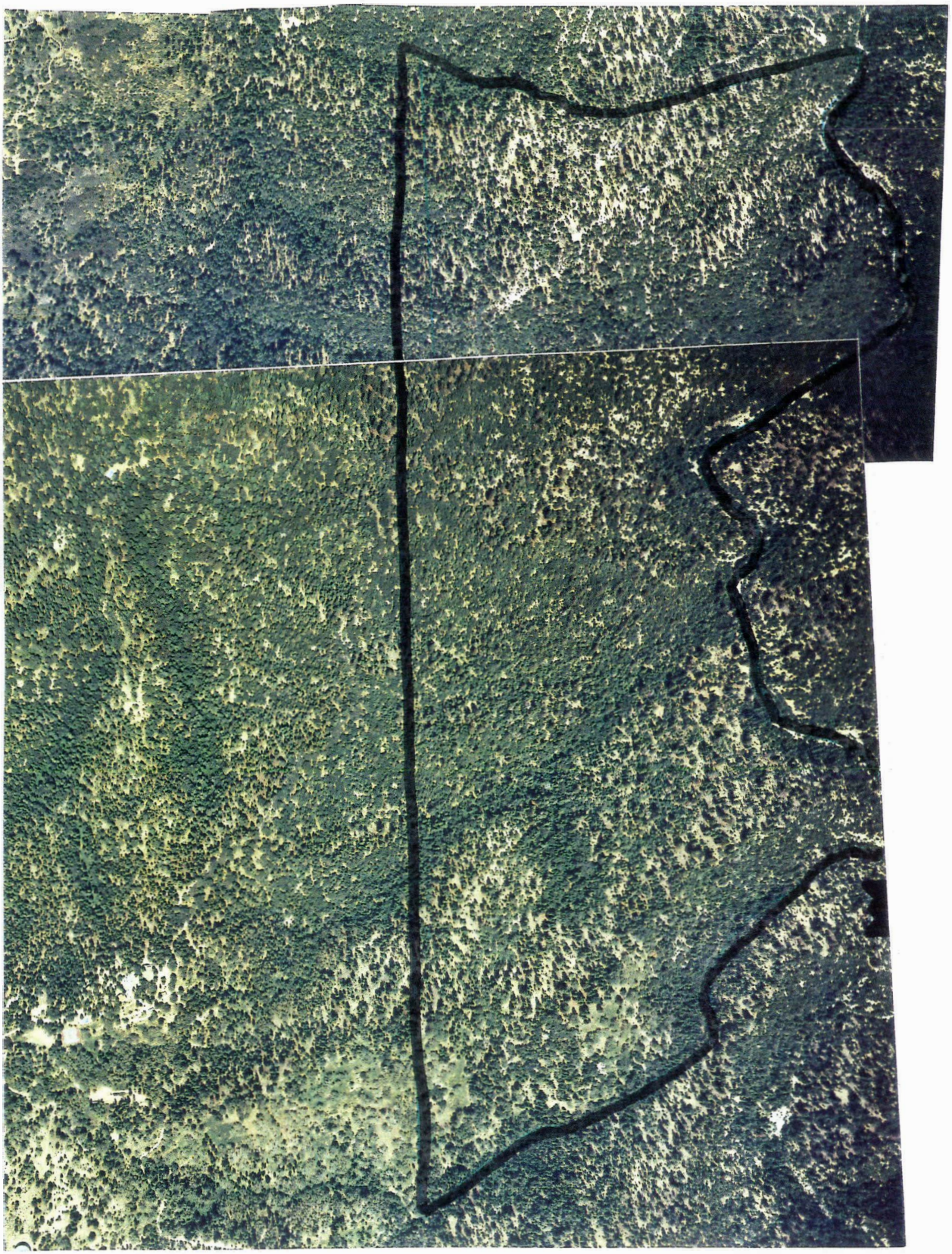


PLATE 1. Fisherman's Camp Candidate Research Natural Area. Natural Color Aerial Photograph. 27 August 1983. Soil Conservation Service. USDA 12-615120-183-115 and 12-615120-183-113.

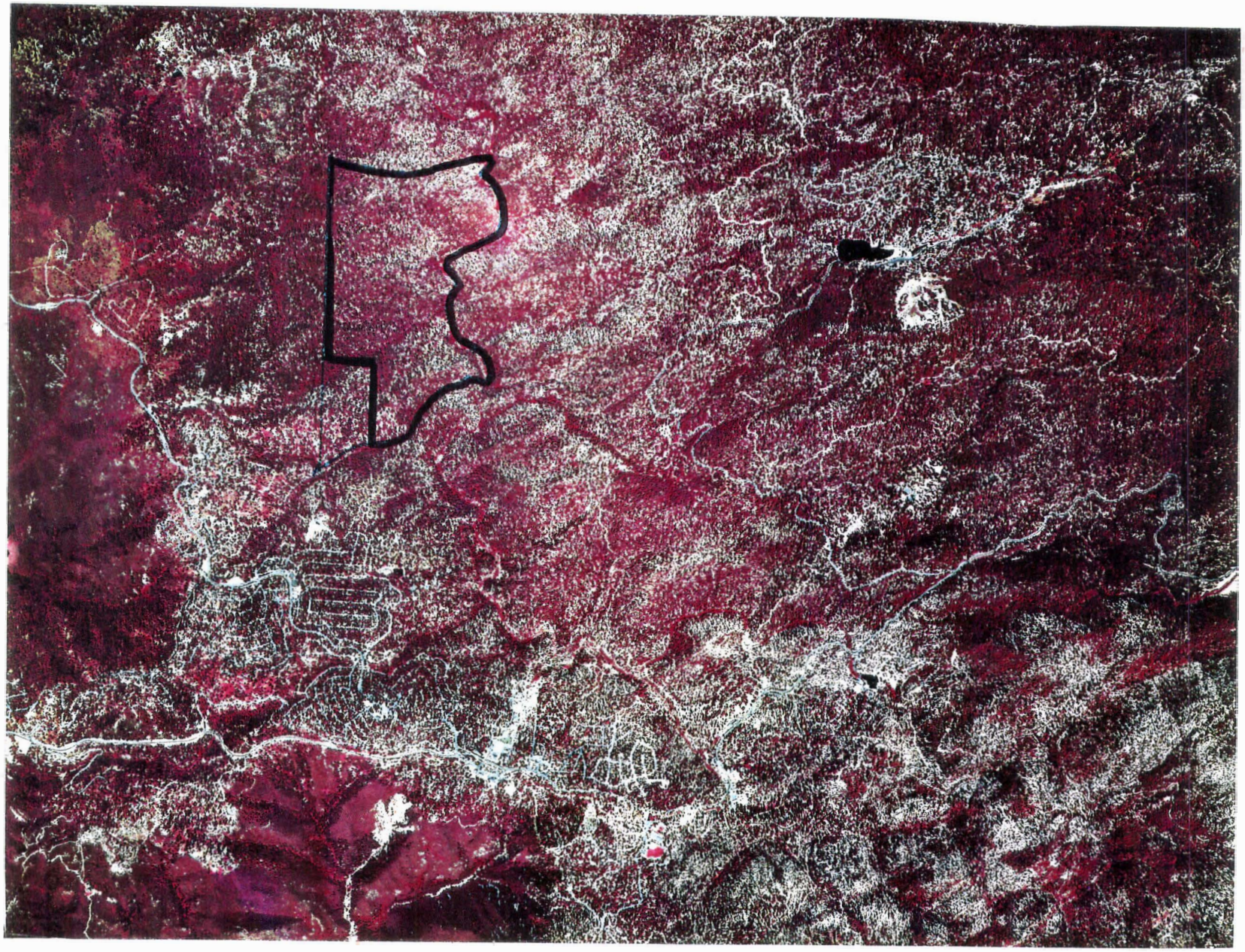


PLATE 2. Fisherman's Camp Candidate Research Natural Area.
Infrared Aerial Photograph. 20 August 1989.
Soil Conservation Service 022 NAPP 1839-023

PLATE 3. Fisherman's Camp General Views

3a. General view of Fisherman's Camp candidate Research Natural Area and surrounding environment. This photograph shows two ridges on the left in the distance that are included within the proposed cRNA boundaries. Neither the foreground nor the ridges on the right side of the photo are included in the cRNA. Deep Creek runs between the two forested ridges. Photograph taken from Wilderness Road, Running Springs.

3b. This complex forest has relatively dense tree layer, with representatives of both the Coulter Pine Forest and the Westside Ponderosa Pine Forest. *Pinus coulteri* occurs together with *P. jeffreyi, P. ponderosa,* and *Pinus lambertiana*, as well as *Abies concolor*, *Quercus chrysolepis,* and *Q. kelloggii.*

a.

b.

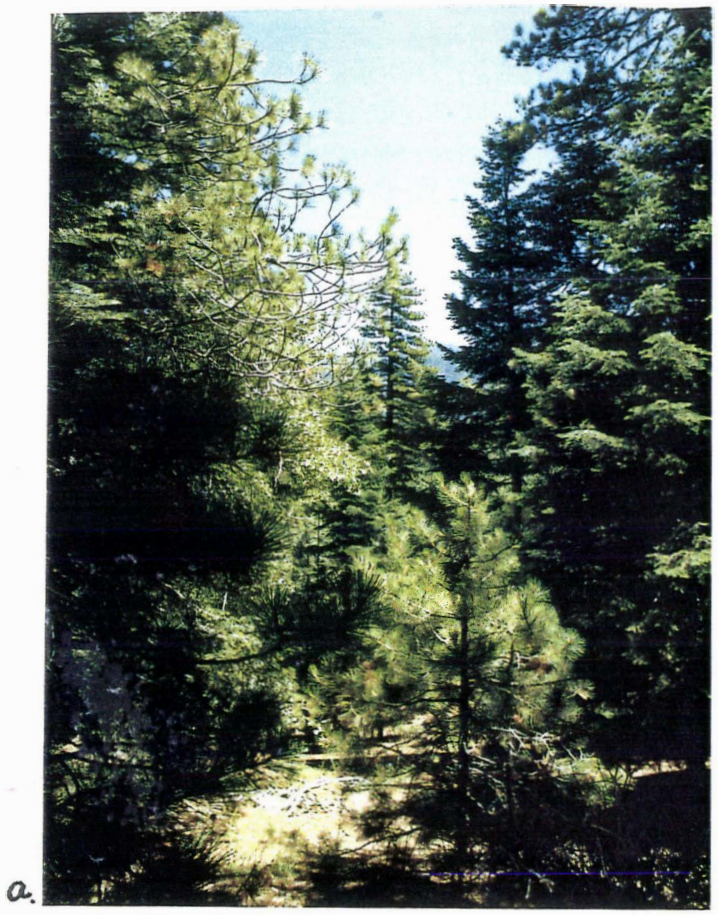
PLATE 3. Fisherman's Camp General View

PLATE 4. Fisherman's Camp Coulter Pine-Westside Ponderosa Pine Forest

4a. *Abies concolor* occurs with *Pinus coulteri* on steep north-facing slopes. Associates in the sparse understory (less than 10%) include *Iris hartwegii* ssp. *australis, Agoseris heterophylla,* and *Pyrola picta,* among others.

4b. At the south end of the site, *Pinus coulteri* is found with *Quercus kelloggii.* Herbaceous associates among the 6" deep pine needle duff include *Eriogonum saxatile, Penstemon labrosus, Lupinus andersonii,* and *Lotus nevadensis.*

4c. Sugar pine, *Pinus lambertiana,* occurs in the north-facing canyons at the Fisherman's Camp candidate RNA.



a.

b.

c.

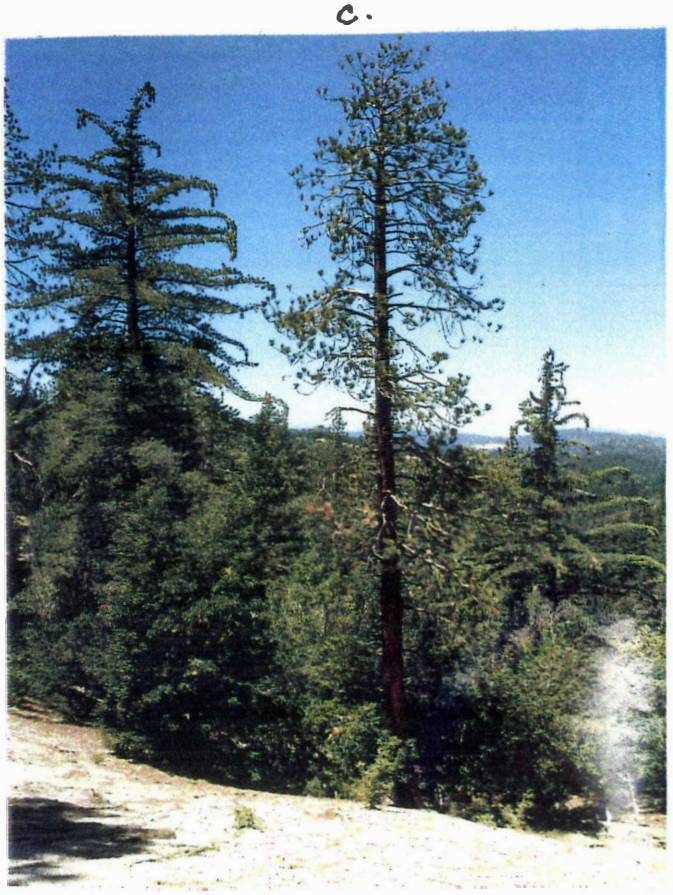


PLATE 4. Fisherman's Camp Coulter Pine-Westside Ponderosa Pine Forest

PLATE 5. Fisherman's Camp Coulter Pine-Westside Ponderosa Pine Forest Forest

5a. Along the ridge and on east-facing slopes, *Pinus coulteri* occurs with *P. jeffreyi, P. ponderosa,* and *Quercus chrysolepis*. *Arctostaphylos pringlei* var. *drupacea* is an important shrubby associate in the sparse understory. Dead standing and fallen trees are common in the forest and provide important habitats for wildlife.

5b. This photograph shows the open, parklike understory characteristic of the Coulter Pine Forest-Westside Ponderosa Pine Forest complex that covers much of this site. Bare ground and boulder-filled canyons are common here.

a.

b.

PLATE 5. Fisherman's Camp Coulter Pine-Westside Ponderosa Pine Forest

PLATE 6. Fisherman's Camp Black Oak Woodland and White Alder Riparian Forest

6a. An open woodland of coulter pine, *Pinus coulteri,* and black oak, *Quercus kelloggii,* here has a dense understory of bracken fern, *Pteridium aquilinum* var. *pubescens.*

6b. Dense thickets of riparian plants, including *Alnus rhombifolia, Cornus stolonifera,* and *Clematis ligusticifolia*, line the banks of Deep Creek and fill the drainages at the site that have a seasonal flow.

a.

b.

PLATE 6. Fisherman's Camp Black Oak Woodland and White Alder Riparian Forest

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